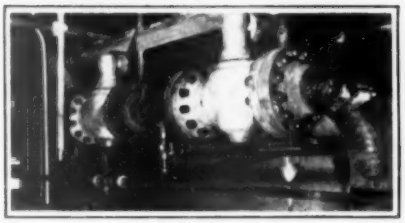
the OIL AND GAS JOURNAL

• 8 inch, ASA 600 Lb. Class, Cameron Non-Lubricated Lift Plug Valves in a pipeline terminal manifold.



•10 inch, ASA 900 Lb. Class, Cameron Non-Lubricated Lift Plug Valves in a refinery platforming unit.

FROM WELL HEAD TO REFINERY, CAMERON LIFT-PLUGS ARE ON THE JOB

This is the valve that has no exact counterpart. It combines all the advantages of both plug and gate valves without retaining the disadvantages of either type. It requires no lubrication, either to assure easy operation, or to effect a pressure-tight seal, consequently it requires no periodic maintenance. A unique cam-crank actuator lifts, turns, and reseats the plug in a continuous three-quarter turn of a lever. The seat, which is separate and not attached to the body, facilitates repair, permits any desired trim, and effects a tight seal that is not affected by body distortions and line strain. Available in a wide range of sizes and service ratings.

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← *Paul Edkin, Cameron's Division Sales Manager, Mid-Continent Division*

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 4 **DECEMBER 28, 1953**

IT'S NEW—IT'S NEWS

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GAS ENGINE LOADS

HEATING LOADS

BOILER LOADS

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with ALUMINUM ALLOY CASE

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Weighs only 63 lb.

Capacity 800 cfh
(at ½" diff. of 0.60 sp. gr. gas)

Working Pressure 100 psi

Connections—45 Lt. or 1½" Female Pipe Thread

Available with Drains for Removing Entrained Liquids.

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DECEMBER 28, 1953 VOL. 52 NO. 34

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In Brief . . .

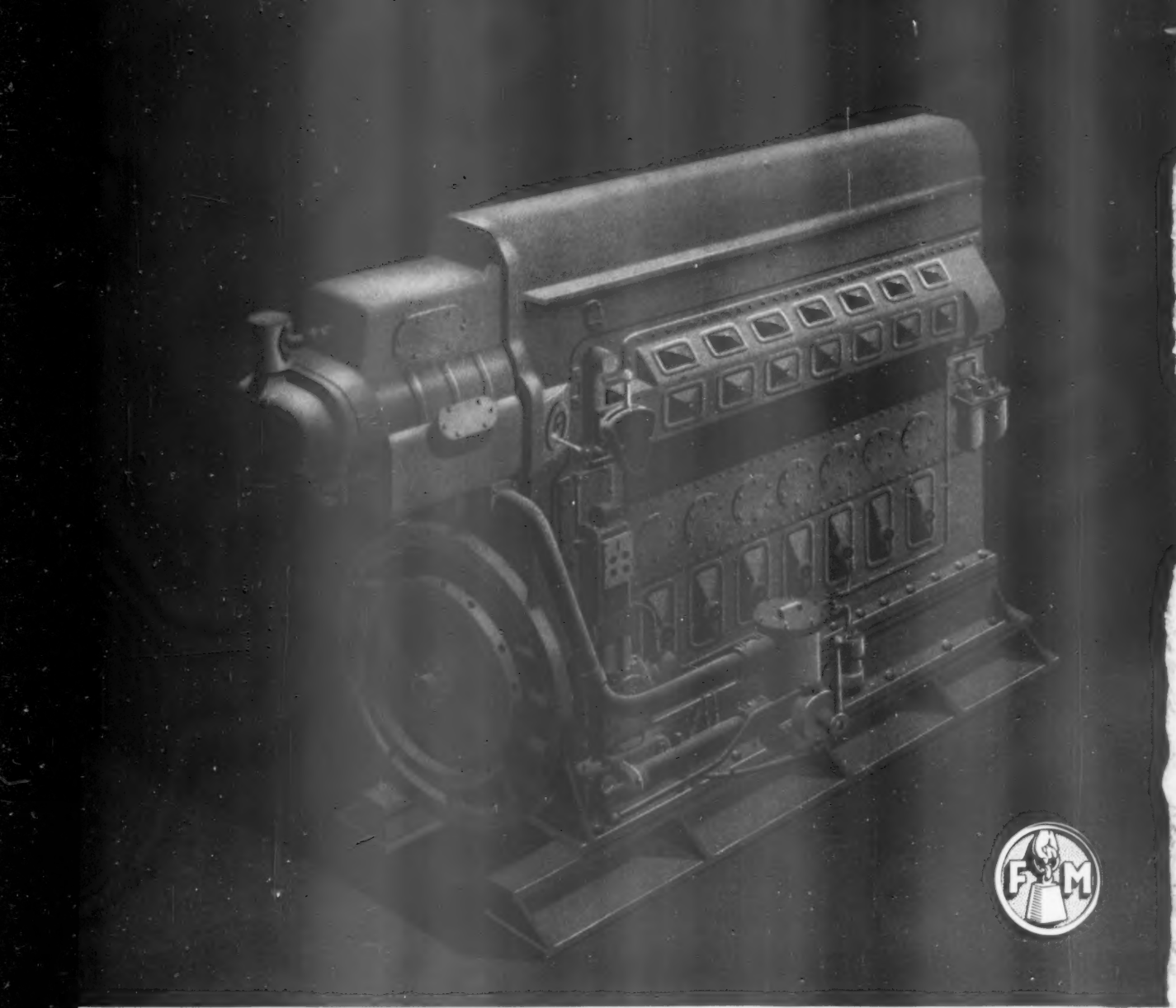
1. SUCCESSFUL FRACTURING . . . Large-volume, high-injection-rate hydraulic fracturing treatments have proved successful in increasing production from some Spraberry wells. One company, in eight wells, using 31,000 lb. of sand and 21,000 gal. of oil per treatment, has obtained production rate increases ranging from 40 to 200 bbl. of oil per day.

2. WIRE MESH . . . The final part of a Journal symposium on the use of wire-mesh sections for entrainment control in vacuum pipe stills is presented. Tide Water Associated Oil Co. at Avon, Calif., reports on improvements obtained after installing mesh sections in two vacuum towers employed to make distillate feed for fluid cat cracker from straightrun residuum. Another case history is given by Aurora Gasoline Corp.

3. PIPE-LINE INSTRUMENTATION . . . A key factor in the trouble-free startup and operation of the world's longest, largest high-pressure crude-oil pipe line, operated by West Texas-Gulf Pipe Line Co., is the instrumentation. An automatic selector system is of particular interest in the pneumatic system. This permits any one of a number of variables to assume control command, provided all others fall on the "safe" side of their respective settings.

4. SECONDARY RECOVERY UP . . . The widespread success of water flooding in Illinois has led to the establishment of 131 separate projects. The percentage recovery from flooding has increased from the date of the initial project in 1943 until it now accounts for 18 per cent of total production. Of the state's oil-productive acres, 8 per cent is now flooded.

5. MAGNETIC RECORDING . . . In the field of seismic exploration, the requirements of the recording system are particularly exacting. These requirements can be met by employing an F.M. carrier system. Block diagrams of the record and playback systems are presented and performance characteristics discussed. Existing development work is directed toward making equipment suitably compact and miniaturized, with minimum power drain.



The Fairbanks-Morse Opposed Piston Diesel Model 38F 90. 225 to 750 horsepower. Diesel, Dual Fuel and Spark-ignition options. Other O-P engines available in horsepower ratings to 2400.

Some engines are not good enough

Yes, there are some diesels which just do not have what it takes for the job. They cannot satisfy the owner's pride in smooth, trouble-free operation and are lacking in the ability to square a balance sheet of operational costs and profits. For the more difficult jobs, many engines are simply not good enough.

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Especially in a tough buyer's market...

Complaints, resulting from clogged oil burner filter screens, can be eliminated in most cases with Du Pont Fuel Oil Additive No. 2

DuPont FUEL OIL ADDITIVE No. 2 can help you boost heating oil sales

With fuel oil in ample supply, you are probably looking for every possible sales feature that will help to improve your market position. And customer satisfaction is a must.

Here's how you can give your customers better service . . . with less servicing.

Du Pont Fuel Oil Additive No. 2 can help you eliminate many complaints arising from plugged filters, screens, and fuel lines. It works three ways:

1. **Retards residue formation**—The antioxidant properties of Du Pont Fuel Oil Additive No. 2 are effective in reducing the rate of insoluble residue formation in distillate fuel oils.

2. **Reduces filter clogging**—If insoluble residues *are* formed, this additive acts as a dispersant to reduce particle size and also enables the particles to pass through filters.

3. **Inhibits rust formation**—In drum storage tests, rust formation above the liquid level was reduced when Fuel Oil Additive No. 2 was added—as compared with untreated fuel oil.

As a result of these three benefits, and the ashless quality of the product itself, clogging of filter screens, nozzles and fuel lines can be practically eliminated through the use of this additive. These benefits can be capitalized in consumer advertising—and Du Pont will help you in the preparation of such advertising material for jobber and dealer use.

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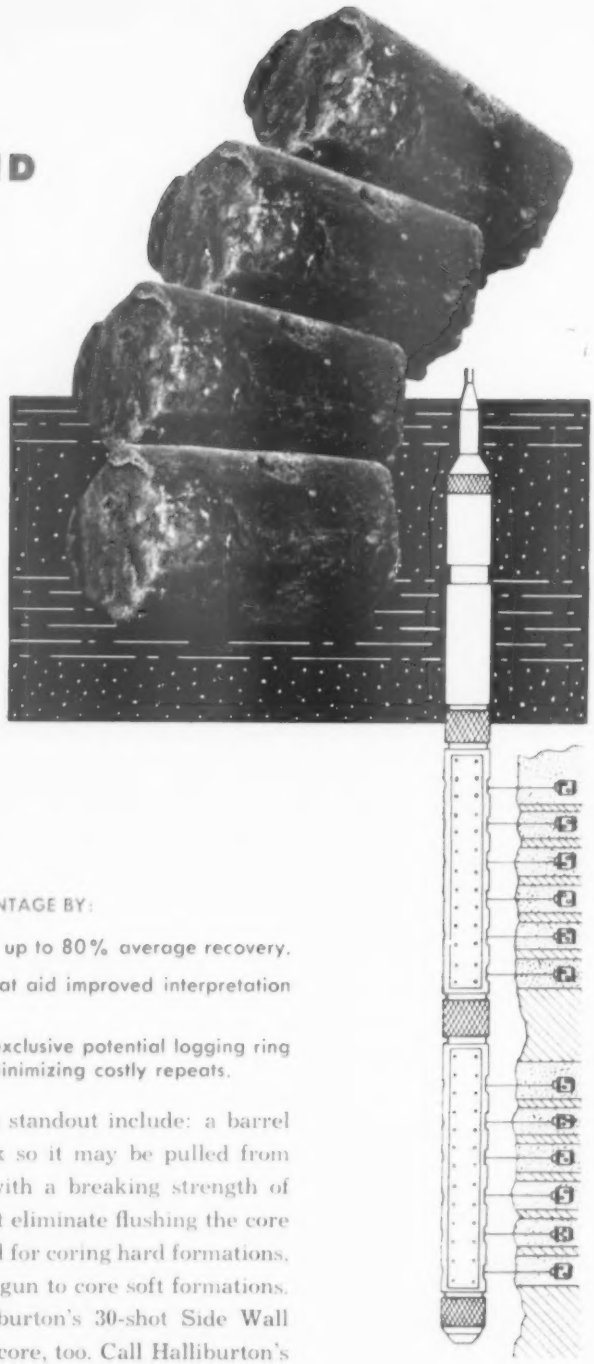
with **HALLIBURTON'S**

SIDE WALL CORING



Fundamentally, this is a tool designed to secure large clean cores. It does that ...*and* it provides another valuable operator benefit.

Halliburton's remarkable 30-shot Side Wall Coring Tool reduces rigtime and pares cost per core.

IT PROVIDES THIS ADDED ECONOMIC ADVANTAGE BY:

- Recovering a higher percentage of cores — up to 80% average recovery.
- Obtaining larger, uncontaminated cores that aid improved interpretation and reduce delays.
- Providing pinpoint positioning through an exclusive potential logging ring that operates simultaneously with coring, minimizing costly repeats.

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YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES!

HALLIBURTON

LUBRICATED PLUG VALVES by WALWORTH

Two Walworth Cast Steel Lubricated Plug Valves in use on the main line of a southeastern gas pipeline.

In addition to Lubricated Plug Valves, Walworth manufactures Gate, Globe, Angle, and Check Valves in a wide range of types and sizes for the oil and gas industries. Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

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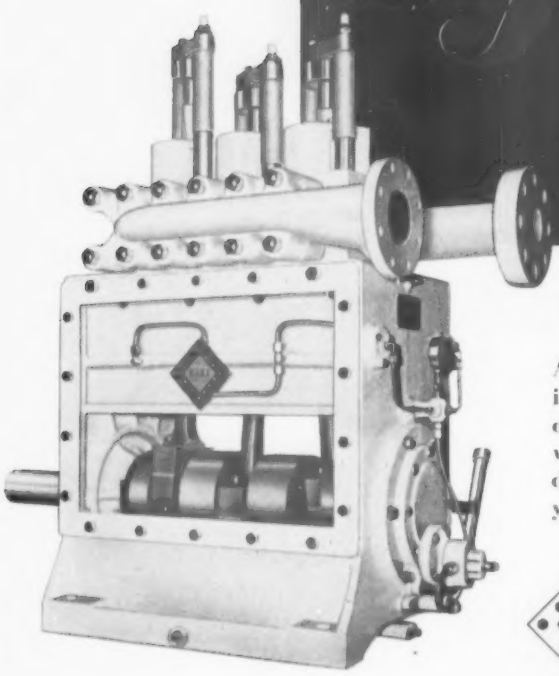

IN YOUR RECOVERY OPERATION

Ability to maintain pressure in water-flooding is vital to efficient oil recovery at minimum costs. You get this dependable performance with the Ajax TP-4000 Pump because it is designed and built with your needs as the yardstick—by the makers of Ajax Engines with a worldwide reputation for reliability. ● Get the Ajax Pump facts—and you'll buy an Ajax Pump! *Write us for descriptive Bulletin 531 - - - see your Supply Man!*

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Part of the welding floor at Grinnell's Warren, Ohio Plant

How shop fabrication of piping

keeps costs down...quality up!

When you specify piping fabricated in Grinnell shops, you are ALL to the good.

Here's why: — Included in the price (which is determined in advance) are such items of expense as:

- Interpretive engineering
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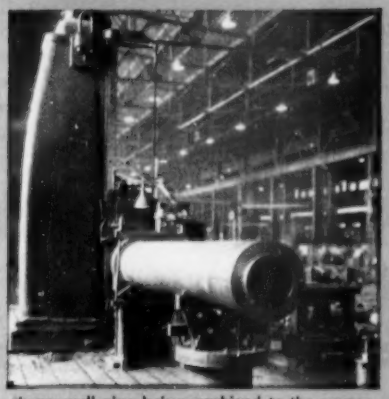
- Heat, light, power, water, compressed air, expendable tools and supplies

But Grinnell even goes further. Grinnell finances material inventories and payrolls for you; carries insurance; makes no charges for waste material or spoilage.

On the production side, too, you benefit. Piping fabricated in Grinnell shops is done under ideal conditions, with modern equipment, by personnel qualified for each class of work. It is rigidly inspected and tested to meet customer's specifications and all applicable codes. Before shipment, it is cleaned inside and outside and painted. It is squared to dimensional tolerances, so that sub-assemblies can be erected at the job site quickly and easily.

You can count on it . . . Grinnell shop fabricated piping *guarantees* maximum quality and economy.



Heavy wall pipe being machined to the proper welding bevel on a post mill

Welding (induction heating coils in place for preheat, welding heat and stress relieving.)

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WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

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On leases where secondary recovery is feasible, waterflooding is often the best answer. It is accounting for big yields in many areas where conventional production methods have ceased to be profitable. Waterflooding is something definitely to be considered before writing off a lease as "worked out."

If you are planning such a system, we strongly suggest you talk with Bethlehem Supply. We have engineers who specialize in waterflooding work, and their broad experience can be very helpful to you and your staff. In addition, Bethlehem is able to furnish complete equipment for a waterflooding layout—the buildings, water-treating and injection facilities, pipe lines, valves, surface pumps, compressors, storage tanks, prime movers, generators, controls, substations, line poles, wiring, pumping units of various sizes and types, sucker rods, and bottom-hole pumps.

A Bethlehem custom-designed turnkey system has these advantages

- Economy in operating cost and maintenance
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- Ease of operation; fully automatic controls where desirable
- Dependable safety devices for full protection of men and equipment
- Layout that can easily be altered or expanded as future needs arise

Bethlehem can do a good job for you—a job that combines sound engineering with reliable equipment. And here's a final point: we can work in thorough harmony with your own men, both the field group and the headquarters staff.

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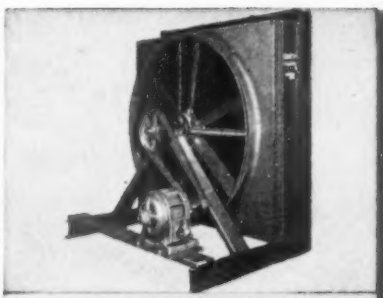
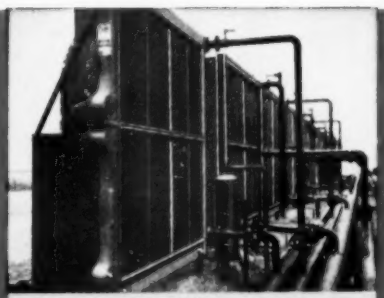


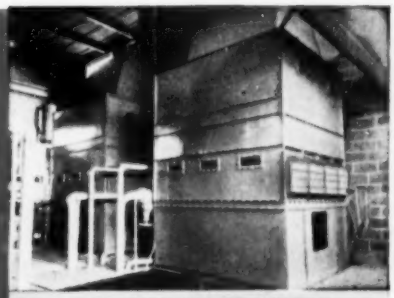
"Mono-Weld" Jacket Water Coolers

Rugged, welded-steel construction assures maximum strength with minimum weight for stationary or semi-portable equipment. Core sections readily replaceable. Tanks easily removed for cleaning.



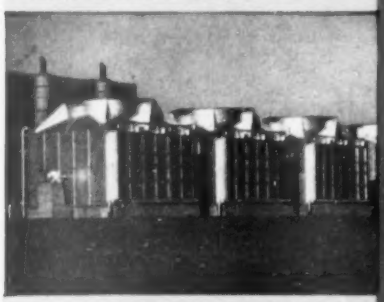
"Full-Flow" Jacket Water Coolers

Sturdy, welded-steel frame with specially-designed Young "Full-Flow" cast tanks. Flexible mountings absorb vibration, allow for expansion and contraction. Tanks easily removed for cleaning.



Evaporative Cooling and Condensing Units

Self-contained units in six basic models, with single or two-coil assemblies. Sectional design provides versatility, ease of handling. Used primarily for cooling Diesel engine jacket water and lube oil.

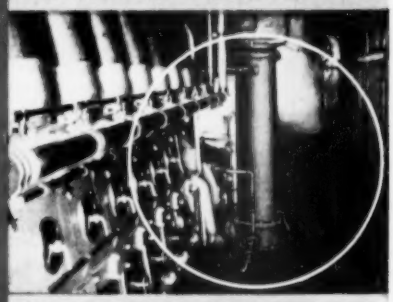


"VAD" Cooling and Condensing Units

Vertical air discharge permits compact multiple unit installations without loss of efficiency due to cross winds. Low-level mounting, low-cost installation, easy inspection and maintenance are features.

"HC" Cooling and Condensing Units

Horizontal core construction with vertical air discharge. Rugged structural design; wide choice of cores; complete with fans, power plants and controls. In single or multiple type units.



Shell and Tube Heat Exchangers

Available in 690 standard models, single to four-pass, fixed and removable tube bundles. Unusually close-tolerance construction assures maximum cooling with minimum weight. Calculator available.

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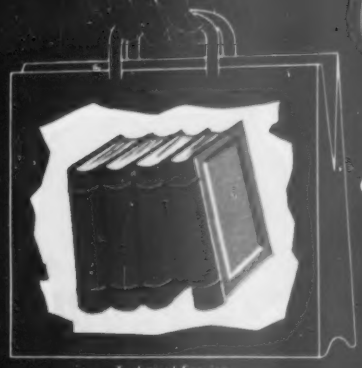

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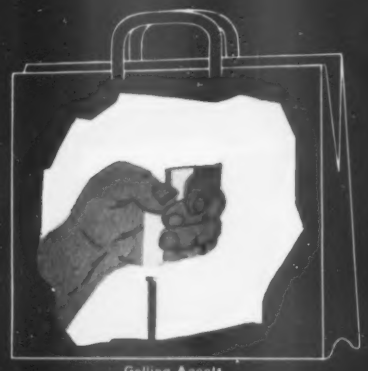
AEROPAN® Drilling Mud Conditioner



Gelling Agents

AEROLUBE® Lubricating Oil Additives

Specialty Catalysts

The extent of Cyanamid's service to the petroleum industry is well illustrated by the wide range of Cyanamid Chemicals—from drilling mud conditioners to lube oil additives.

Cyanamid Service, however, is more than chemicals. It is constant research . . . extensive manufacturing facilities . . . and a skilled staff of technical field specialists—all carefully integrated to meet chemical requirements in every phase of production and refining.

Cyanamid Service, too, is a continuing program of plant expansion designed to keep pace with the petroleum industry's rapid growth. Results of this program have been milestones in petroleum progress. In the field of synthetic catalysts, for example:

1942 . . . Cyanamid starts production of synthetic fluid cracking catalysts at Fort Worth, Texas, to help refiners meet demand for high octane fuel.

1946 . . . Cyanamid becomes the first company to manufacture microspheroidal cracking catalysts on a commercial scale.

1951 . . . Cyanamid builds new MS plant at Michigan City, Indiana, as refining demands continue to grow.

AEROFORM® MS Fluid Hydroforming Catalysts

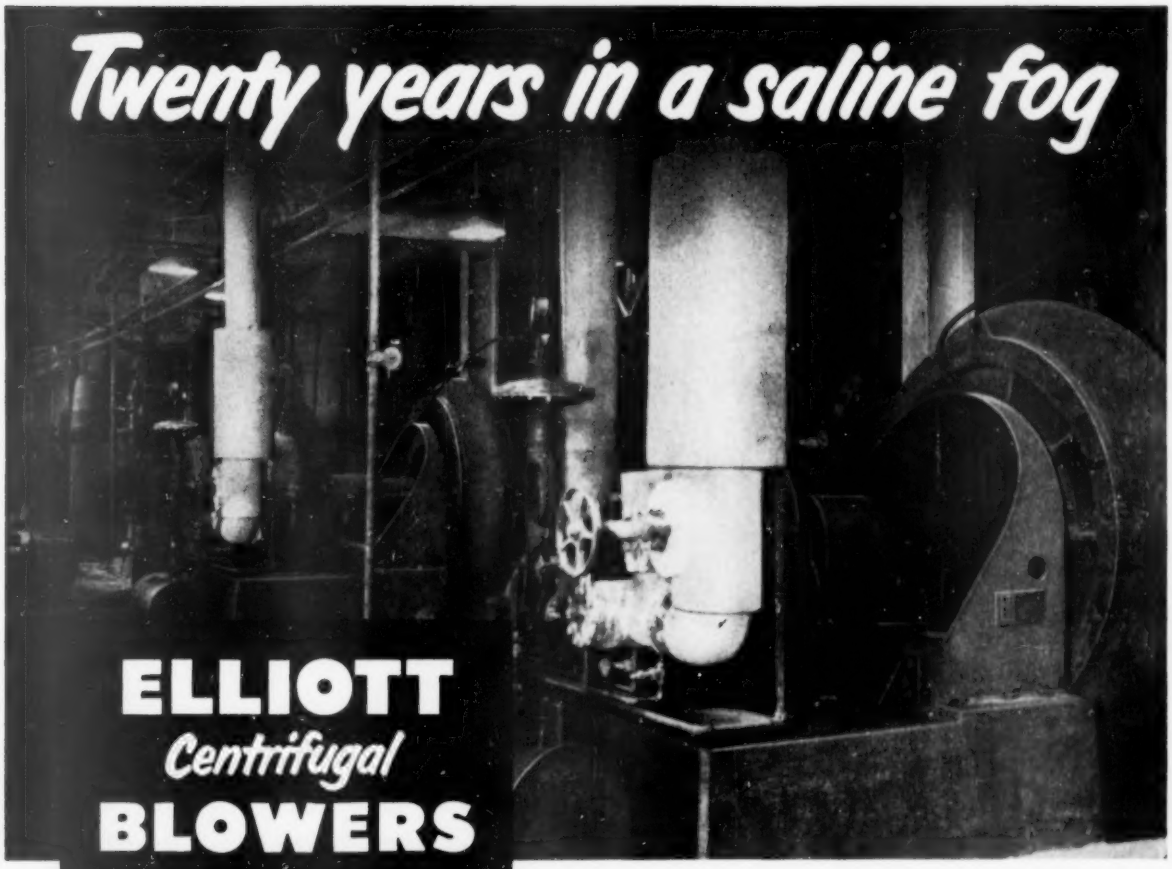
AEROCAT® MS Synthetic Fluid Cracking Catalysts

AMERICAN Cyanamid COMPANY

REFINERY CHEMICALS DEPARTMENT, DIV. OG-12
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

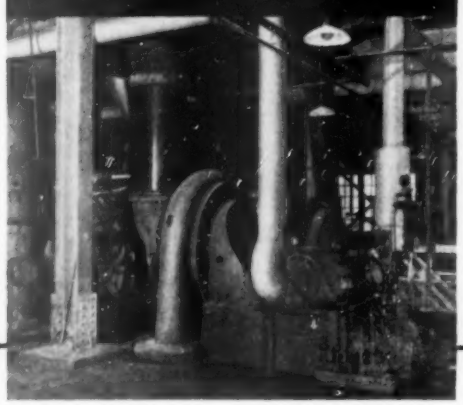
In Canada: North American Cyanamid Limited, Toronto and Montreal

Twenty years in a saline fog



ELLIOTT *Centrifugal* BLOWERS

ELLIOTT CENTRIFUGAL BLOWERS pull brine-saturated air for the U. S. Potash Company in separating potassium chloride from sodium chloride and other impurities. Photos show part of the line of eleven blowers, all still going strong, although the original units have served since 1932. Each blower is rated 12,640 inlet cfm, with an inlet pressure of about 23.0 in. Hg, absolute, discharging to atmosphere (barometer 26.5 in. Hg) and is driven at 3670 rpm by an Elliott steam turbine developing 160 hp.



Operation is non-stop 363 days per year, handling air that is saturated with brine resulting from the hot solution leaching process used in separating potassium chloride from the sodium chloride and other impurities with which it is found. After crystallization of the potassium chloride in the solution, it is filtered, during which the Elliott blowers located at the suction end of the filters draw heated air through the filter drums. The possible corrosive action of the brine-laden air is minimized by impellers of special alloy.

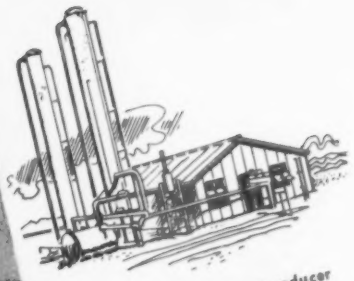
It is significant that twenty years of this rigorous service, with only occasional outage for maintenance, has no terrors for Elliott blowers. The original unit is still going strong.

For complete data on Elliott blowers, contact your local Elliott engineer, or write Elliott Company, Jeannette, Pa.

ELLIOTT Company

Centrifugal Blower Department

P3-3



The Cleveland CU speed reducer shown at work here is part of the closely controlled cooling system on 3 gas-driven compressors in a prominent plant in Texas. Thousands of these compact, heavy-duty vertical Clevelands are at work in the oil and gas country in applications where the need for positive control of cooling is essential.

Controlled cooling with CLEVELAND CU vertical drive

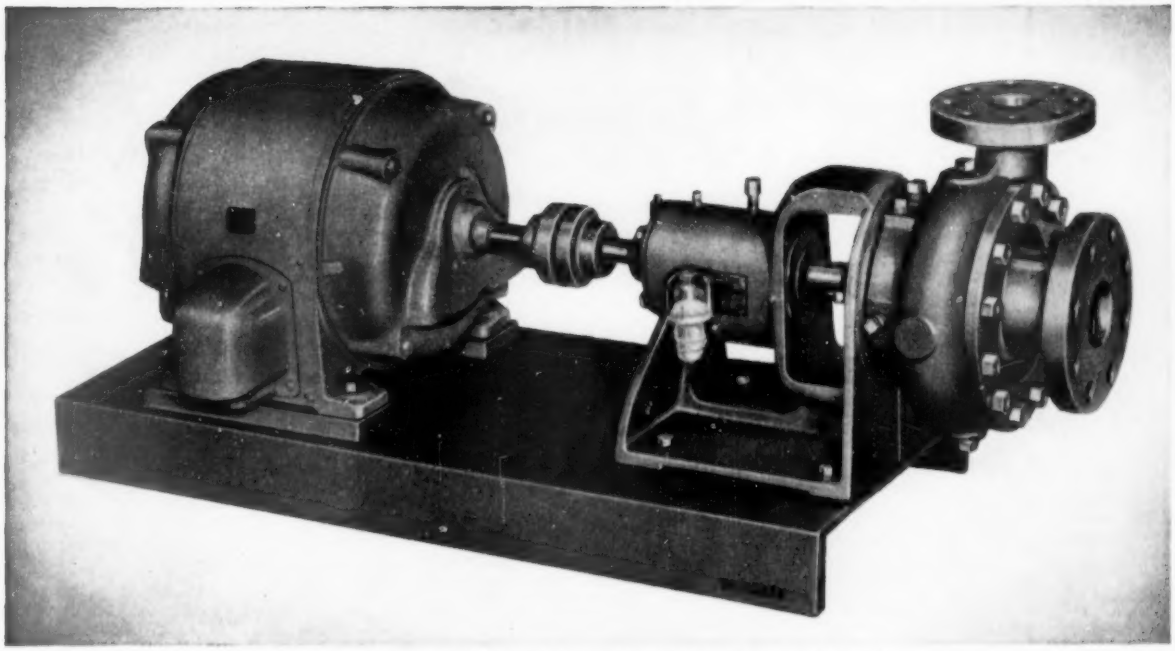
THIS Cleveland cooling tower unit is at work in a Texas gas treating plant. It drives a fan at proper predetermined speed to deliver the volume of air necessary to cool compressor jacket water. There is never any unwanted fluctuation in fan speed to disturb temperature control.

The Cleveland CU worm gear speed reducer is specifically designed to meet the special conditions in cooling tower service: Large diameter shaft, tapered roller bearings on fan shaft which carry heavy thrust and radial loads, heavy externally ribbed housing which rigidly maintains gear alignment, case-hardened steel worm meshing with a long-wearing, specially constructed bronze gear. All these features, backed by 41 years of specialization on worm-gear engineering, make Cleveland drives an economical and dependable investment.

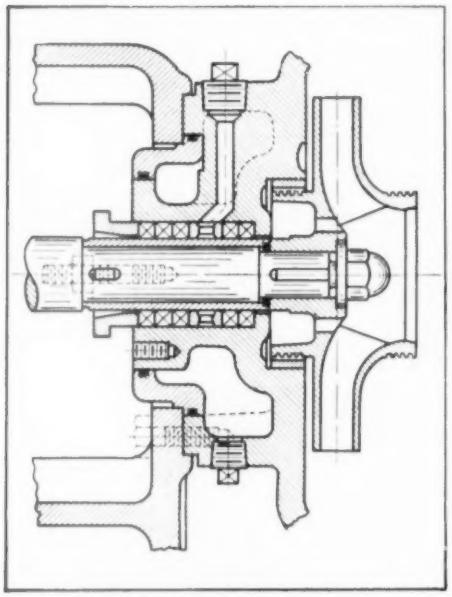
If it's controlled cooling you want, get the drive that's built to give it—the Cleveland CU. Write today for new Catalog 400. The Cleveland Worm and Gear Company, 3286 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers



THE NEW WORTHINGTON TYPE CNR CENTRIFUGAL PUMP is designed to give dependable, trouble-free performance on a wide variety of refinery jobs.



WATER-COOLED STUFFING BOX provides longer life for packing and bearings. Cross-sectional view shows water-jacketing.

Here's another Worthington pump that makes refinery operations more efficient

It's our compact, single-stage Type CNR centrifugal pump, built to handle such refinery jobs as treating, blending, loading and transfer.

Here are some of the features of the modern CNR centrifugals:

1. HEAVY CASINGS in iron or steel for extra wear under high pressure and corrosive conditions.

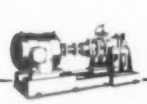
2. WATER-COOLED STUFFING BOXES with conventional packing or mechanical seals optional.

3. HEAVY-DUTY CONSTRUCTION with 250-pound ASA flanges (150-pound in steel) for really rugged service.

4. INTERCHANGEABILITY. The CNR is part of our SESC pump line. That means complete interchangeability of any pump component for easier servicing, broader range of pump selection and greater availability.

You can get the new CNR's in capacities up to 2700 gpm, to handle temperatures up to 350° F.

Write for Bulletin W341-B16 to Worthington Corporation, Centrifugal Pump Division, Harrison, New Jersey. C-3.9



Types HR and HB. Twenty sizes. Capacities up to 1,800 gpm. Developed heads up to 900 ft. Proper selection of material permits use for temperatures far below zero to 800 F. for pressures from high vacuum to 750 psig.

Type HD. Hydraulically-balanced double-suction impeller handles boiling liquids with low submergence. Capacities range from 600 to 3,200 gpm at heads up to 700 ft. To 850 F and 550 psig.

Type CNE. For loading or transfer service. Capacities to 2,700 gpm. Heads to 500 ft.

Type HM. Available in 12 sizes. Capacities to 700 gpm. Heads to 475 ft. Up to 500 F.

WORTHINGTON

Centrifugal Pumps

The World's Broadest Line Assures You the Right Pump for Every Job

a dependable **Air-Cooled Heat Exchanger**

because completely G-R

Cooling surface
overhang of sections provides 100% effective surface

Wind resistance
designed to withstand wind pressure of more than 40 lbs. per sq. ft.

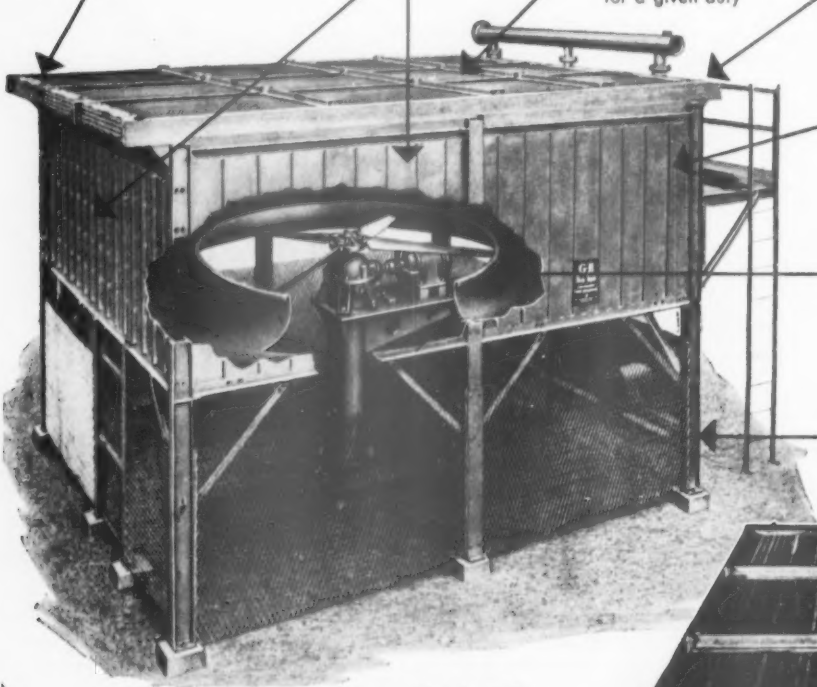
Heat transfer
smooth K-Fins of the exclusive G-R K-Fin Cooling Sections provide least resistance to flow of air across sections and lowest horsepower for a given duty

Protection against freezing
all sections are sloped for complete drainage

Installation convenience
fully prefabricated structure designed for bolted joints with no field welding necessary

Efficiency
bell-type fan ring requires least horsepower for fan

Provision for expansion
H-column main beams of single cells are predrilled for addition of future units



The new G-R **fin-fan** . . . *completely G-R* . . . has several important advantages of design and construction. The complete unit can be depended upon for strength, effectiveness, and convenience of installation, operation and maintenance.

Write for complete information.

THE GRISCOM-RUSSELL CO., MASSILLON, OHIO

G-R HEAT TRANSFER APPARATUS **fin-fan Air-Cooled Exchanger**

GR-522A

MORE AND MORE MANUFACTURERS ARE INSTALLING
MARVEL SYNCLINAL FILTERS
AS STANDARD EQUIPMENT

Manufacturers of hydraulically actuated equipment and others with low pressure liquid circulating systems demand their equipment to perform consistently and with all the productive efficiency they build into the machine that bears their name. Since these systems must be kept free of damaging particles, the selection of a filter is an important factor. Here are some of the outstanding reasons for the increasing preference for Marvel Synclinal Filters to do this all-important job!

SUMP TYPE
(Cutaway)

BECAUSE . . . Marvels are designed to give maximum ACTIVE filtering area rather than total filtering area. Only ACTIVE FILTERING AREA COUNTS!

BECAUSE . . . Marvels greater storage space for filtered out particles allows longer periods of "production" time at absolute minimum in maintenance cost and "down-time".

BECAUSE . . . Marvels can be disassembled, cleaned and re-assembled by any workman in a matter of minutes.

BECAUSE . . . Marvels (Both Sump and Line Type) operate at full efficiency in any position. Line type may be serviced without disturbing pipe connections.

BECAUSE . . . Marvels are protected and of sound construction to give long life and efficient filtration.

BECAUSE . . . Marvels (Both Sump and Line Type) are available in individual capacities from 5 to 100 G.P.M. and choice of mesh sizes ranging from coarse 30 to very fine 200, they get a filter to fit their specific requirements.

BECAUSE . . . Marvel not only delivers a top grade filter in both quality and performance, but delivers IMMEDIATELY—shipments are made the same day orders are received, if desired.

LINE TYPE
(Cutaway)

FACTS NOT CLAIMS

Engineers decide on the basis of the record, on the basis of measurable facts rather than claims of the "campaign promise" variety. Here is a fact with meaning:

OVER 400 MANUFACTURERS MAKE MARVEL SYNCLINAL FILTERS THEIR O.E.M. CHOICE

For Dependable Protection on All Hydraulic and Low Pressure Systems Investigate MARVEL SYNCLINAL FILTERS

TEST AND INSPECT — BEFORE YOU BUY!

To qualified engineers and operators in oil companies and contracting firms we will send a MARVEL SYNCLINAL FILTER to test and inspect before purchase. Please advise type, (Sump or Line), G.P.M. and mesh size you desire for this purpose.

WATER FILTERS

In response to the great demand, we have adapted both our sump and line models for use in all water filtering applications. No changes have been made in the basic synclinal design.

MARVEL *Engineering Company*

625 WEST JACKSON BLVD., CHICAGO 6, ILLINOIS

Phone—Franklin 2-4431

COUPON

OG-12

Marvel Engineering Company
625 W. Jackson Blvd., Chicago 6, Ill.

Without obligation, please send me complete engineering data on Marvel Synclinal Filters as follows—

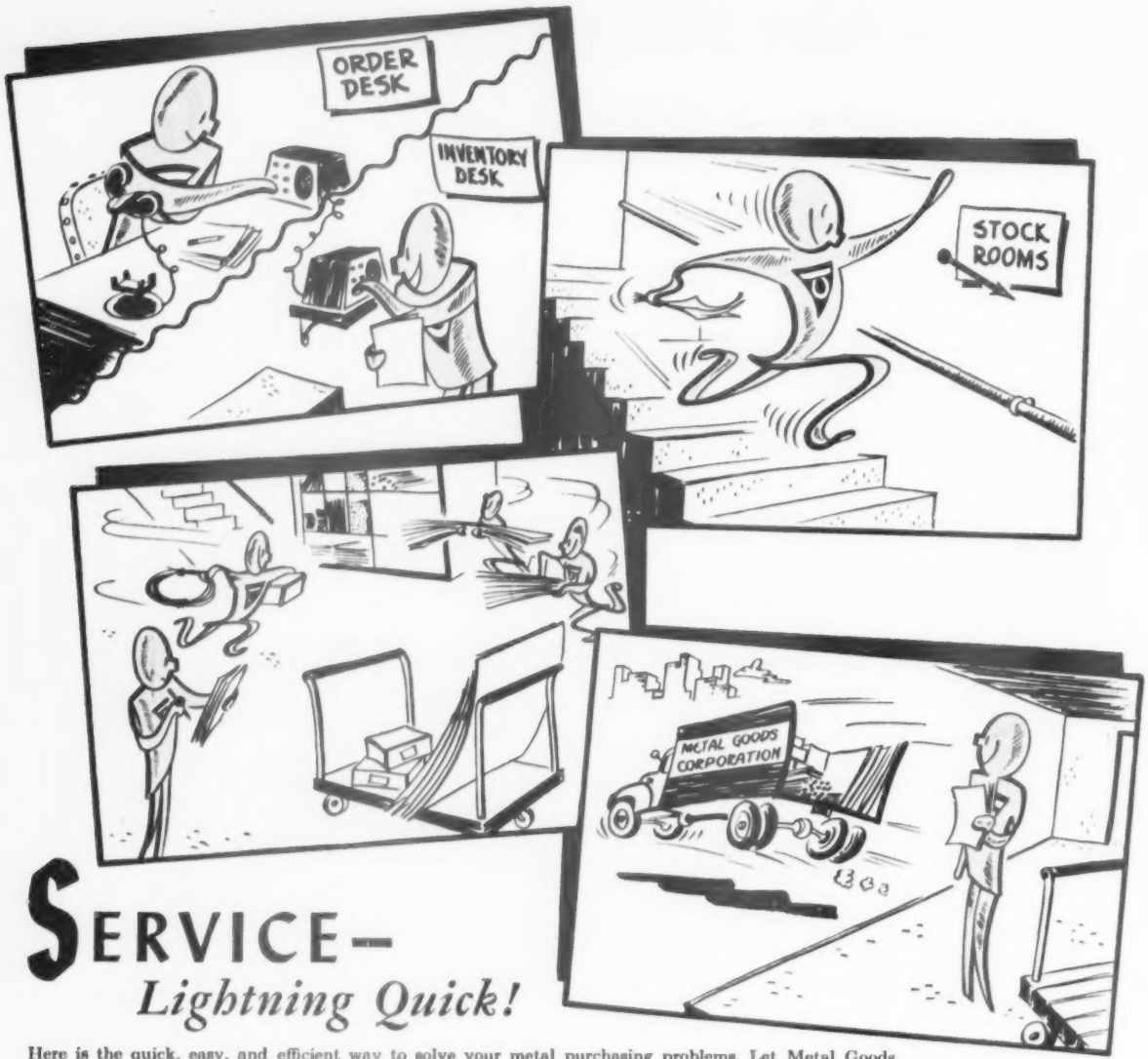
Catalog #106 for Oil Filters
Catalog #300 for Water Filters

Name

Company

Address

City State



SERVICE—
Lightning Quick!

Here is the quick, easy, and efficient way to solve your metal purchasing problems. Let Metal Goods Corporation supply all your metal needs.

One call . . . one requisition . . . one invoice . . . that's the modern, time-saving, cost-cutting way to buy metals. When you want aluminum, brass, copper, monel*, nickel*, inconel*, stainless steel, and steel—make one call to Metal Goods Corporation.

*Not sold in St. Louis or Kansas City

7 warehouses and 11 Sales Service offices to serve you. Call your nearest office.

METAL GOODS CORPORATION

OFFICES AND WAREHOUSES

St. Louis 15, Missouri
5239 Brown Avenue
Nelson L. Hower
Phone: GOodfellow 1234

Tulsa 3, Oklahoma
302 North Boston
Scott J. Harrison
Phone: 4-4101

Kansas City 16, Mo.
1300 Burlington
Frank D. Hogan
Phone: NOrday 3516

Denver 2, Colorado
2425 Walnut Street
Neal Dehn
Phone: AComa 5891

Dallas 9, Texas
6211 Cedar Springs Rd.
Sam D. Hodgdon
Phone: ELmhurst 3271

Houston 3, Texas
711 Milby Street
Harris T. Gregg
Phone: CEntral 8881

New Orleans 12, La.
432 Julia Street
Carl T. Wedemeyer
Phone: CAnal 7373

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Ray Noller
Phone: AMherst 7-8921

Decatur, Illinois
1305 West Sunset
Arlie W. Tempel
Phone: 8-1314

Beaumont, Texas
238 Bowie Bldg.
Lee T. Dodson
Phone: 4-7536, 4-7537

San Antonio, Texas
2012 Alamo Natl. Bldg.
Charles I. MacKenzie
Phone: GArfield 3161

Memphis, Tennessee
713 Columbian Mutual Tower Bldg.
Robert W. Downs
Phone: 5-8721

Fort Worth, Texas
3821 Carolyn
John M. Turbitt
Phone: FOrtune 4369
FOrtune 5326

Corpus Christi, Texas
Room 301-02 Wilson Bldg.
Roy D. Bagaley
Phone: 4-0366

Jackson, Mississippi
781 Raymond Road
George E. Akerberg
Phone: 5-2711

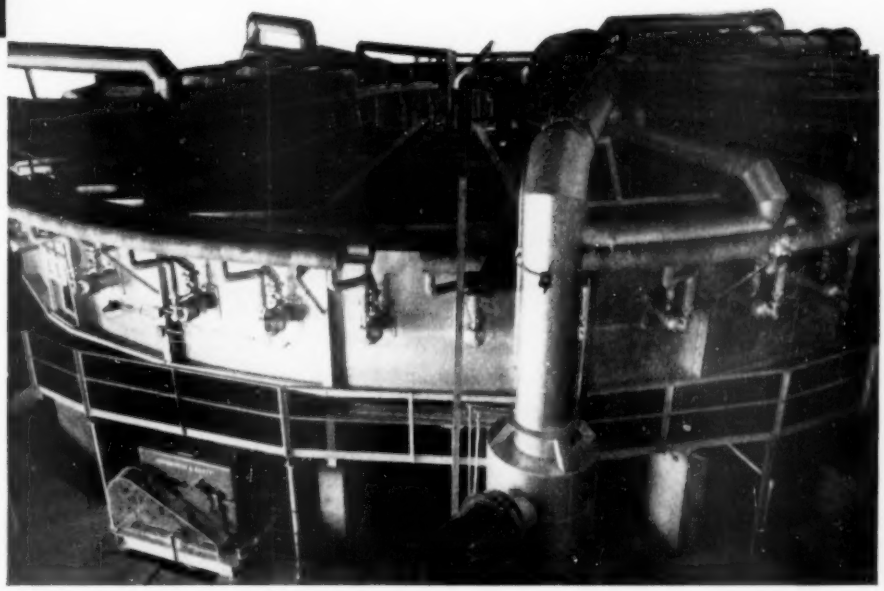
Omaha, Nebraska
3515 No. 67th Avenue
C. M. Cooley
Phone: WAlnut 1112

Bettendorf, Iowa
P. O. Box 181
Harry L. Newton
Phone: 5-1232

Des Moines, Iowa
2600 Woodland
W. P. Crowley, Jr.
Phone: 4-9923

GENERAL OFFICES: ST. LOUIS 15, MISSOURI

CF&I SEAMLESS TUBE MILL



the giant that breathes flame

A giant 70-ft. rotary furnace, one of the largest ever constructed for American industry, has been installed in the new mill. Carefully controlled, uniform heating of steel billets is vital to the production of quality seamless oil country tubular goods. This new revolving-hearth furnace is designed to give a maximum degree of uniformity in the heating process. Billets processed in this furnace range in size from 3 to 8½ inches in diameter and from 4 feet 9 inches to 18 feet in length. The heated billets emerge from the exit ports and are fed directly to the piercing mills.

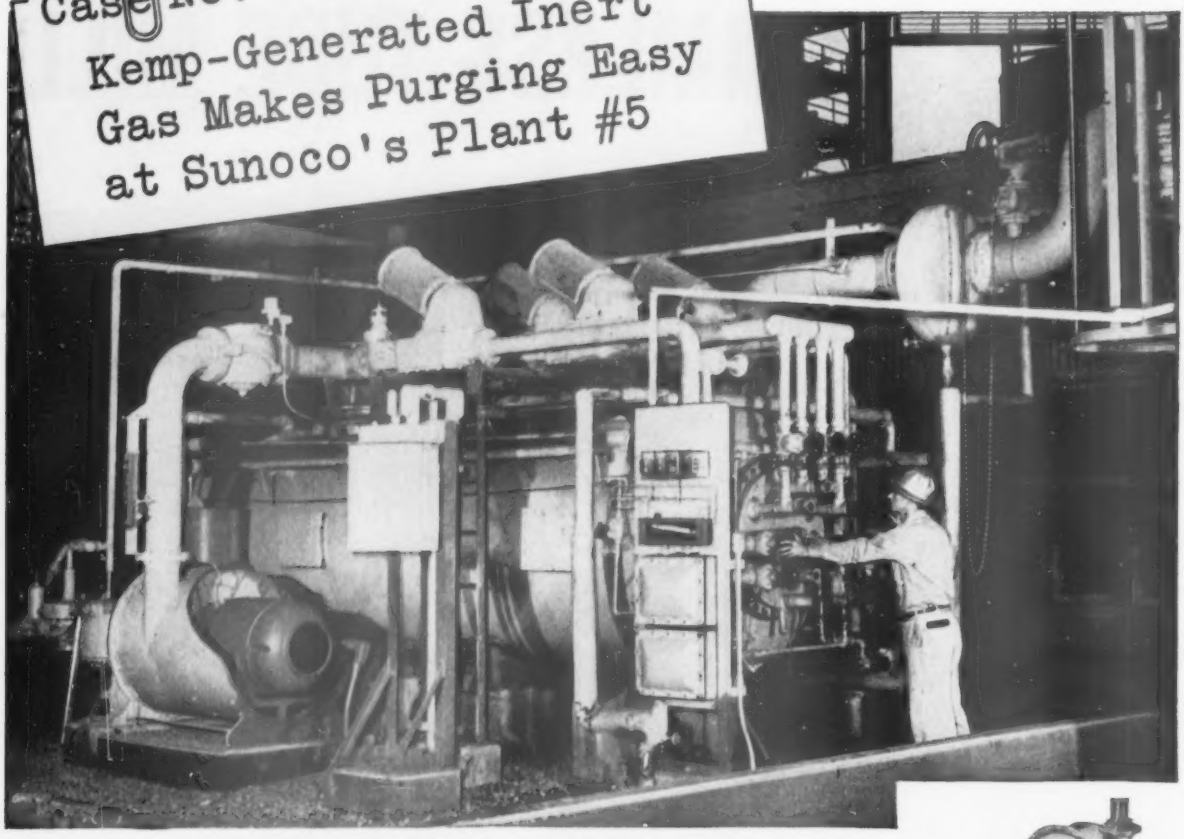
CF&I seamless oil country tubular goods meet API STD 5A specifications and are available in sizes ranging from 2⅜" O.D. through 9⅝" O.D. The finest equipment plus quality control from ore through all steps of production assure a product that meets the exacting requirements of the petroleum industry.

CF&I TUBULAR PRODUCTS

THE COLORADO FUEL AND IRON CORPORATION CFI

DENVER, COLORADO

Case No. 57
Kemp-Generated Inert Gas Makes Purging Easy at Sunoco's Plant #5



How Sun Oil's "Magic Mill" at Toledo operates with 'round the clock safety

There's no *one* word that strikes terror in the hearts of oilmen everywhere more quickly than F-I-R-E! To combat this threat at the Sun Oil Co.'s giant refinery at Toledo, Ohio, constant vigilance, checks and inspections are the answer. And the liberal use of inert gas for purging pipelines, tanks and crackers is essential to this safety maintenance.

Kemp selected to do the job

When plans called for *doubling* plant production in 1950, a new Kemp Generator (see above) was installed to insure adequate inert gas production. Fast-starting, easy-to-operate, this Kemp unit more than filled the bill. Today tanks and lines are periodically purged for inspection and cleaning *as often as needed*. And thanks to its 60,000 cu. ft. per hr. Kemp Inert Gas Generator, Sunoco enjoys *exact analysis* inert production that meets all its purging requirements.

Let Kemp help you, too

If you have a purging or blanketing problem, why not let Kemp Engineers give you the same helpful advice used so profitably at Sun Oil's Toledo refinery. It costs you nothing to investigate. And it may save you money. Find out how Kemp's wide range of dependable, low-cost Generators (complete with the latest fire checks and safety devices) offer you the best way to solve your problems.

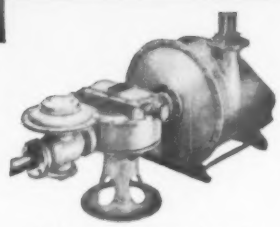
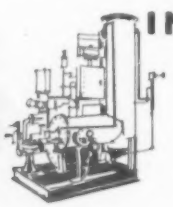


Photo above shows close-up view of Kemp Industrial Carburetor, the heart of every Kemp installation. Assures complete combustion... without waste, without tinkering. Reduces installation costs, simplifies maintenance.

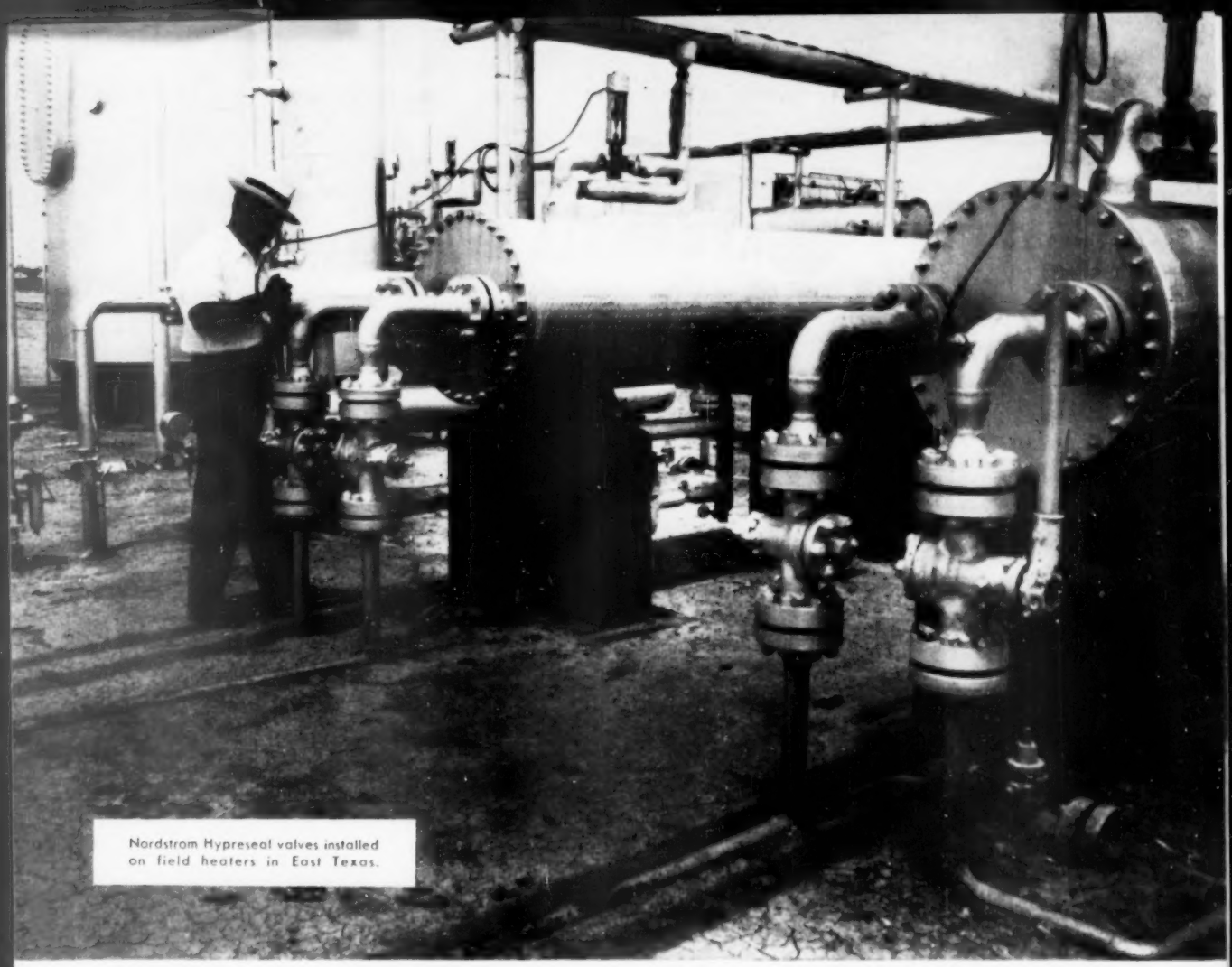
For more complete facts and technical information, write for Bulletin I-10 to:
C. M. KEMP MFG. CO., 405 E. Oliver Street, Baltimore 2, Maryland.

KEMP OF BALTIMORE



INERT GAS GENERATORS

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • ADSORPTIVE DRYERS • SINGEING EQUIPMENT



Nordstrom Hypreseal valves installed on field heaters in East Texas.

Why Nordstrom Valves Last Longer on PRODUCTION SERVICES

Buyers who have more than one type of valve installed on production lines notice that Nordstroms far outlast their other valves and they ask why. *Here's the reason—*

Nordstroms have the simplest of all valve designs; just a body, cover and plug. This means there are less parts to maintain.

In addition to simple, rugged design, Nordstrom valves are carefully manufactured in a wide range of metals, each especially suited to the service for which it's sold.

Wherever you are in the oil fields, you're close to a supply house with Nordstrom valves and Nordstrom service.

But most important is the fact that the vital seating surfaces of a Nordstrom valve are never separated and are protected against *wear*, *corrosion*, *erosion* and *abrasion* by a film of lubricant.

Back up these reasons with Nordstrom's better than thirty years experience in manufacturing valves and lubricants and you have the answer to why Nordstroms far outlast other types of valves in production services. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Canadian Licensee: Peacock Brothers Limited

ROCKWELL Built
Nordstrom Valves
Lubricant-Sealed for Positive Shut-Off

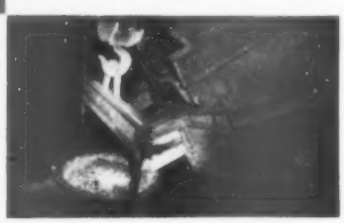
Another ROCKWELL Product

AVONDALE has 3 complete facilities for a well rounded service to the Oil Industry

MAIN YARD • Avondale, Louisiana . . . ship and barge building and repairs, tank cleaning, steel fabrication, and pipe-joint platforms for offshore drilling.

HARVEY YARD • Harvey, Louisiana . . . quick repairs, drydocking, and propeller service.

SERVICE FOUNDRY • New Orleans, Louisiana . . . iron, steel and non-ferrous castings, cut gears, and large capacity machine work.



AND NOW . . . As a further development Avondale has, under construction, a plant and facilities of large capacity for the manufacture of architectural porcelain enamel products, such as: load-bearing walls, exterior curtain walls, and allied materials. Production on a volume basis will begin about January, 1954.

ANOTHER FORWARD STEP IN THE INDUSTRIAL GROWTH OF AVONDALE!

AVONDALE MARINE WAYS, INC.

P. O. BOX 1030, NEW ORLEANS 8, U.S.A.

MAIN PLANT
Avondale, La. • UNiversity 4561

"QUICK REPAIR PLANT"
Harvey, La. • EDison 4211

SERVICE FOUNDRY
416 Erato St.—New Orleans • CAnal 3836

Everything's under control...

by O-C-T

Oil industry control problems are no old story to O-C-T engineers. This specially designed O-C-T Tree, for example, is installed on an LPG storage well for the Reef Fields Gasoline Plant. Severe vibrations due to pump pulsations prevented the use of conventional controls . . . so O-C-T engineers designed a special casing hanger to withstand these vibrations. Now, everything's safely under control . . . by O-C-T. When you have any type of well control problem, O-C-T is your best bet to solve it quickly and economically.

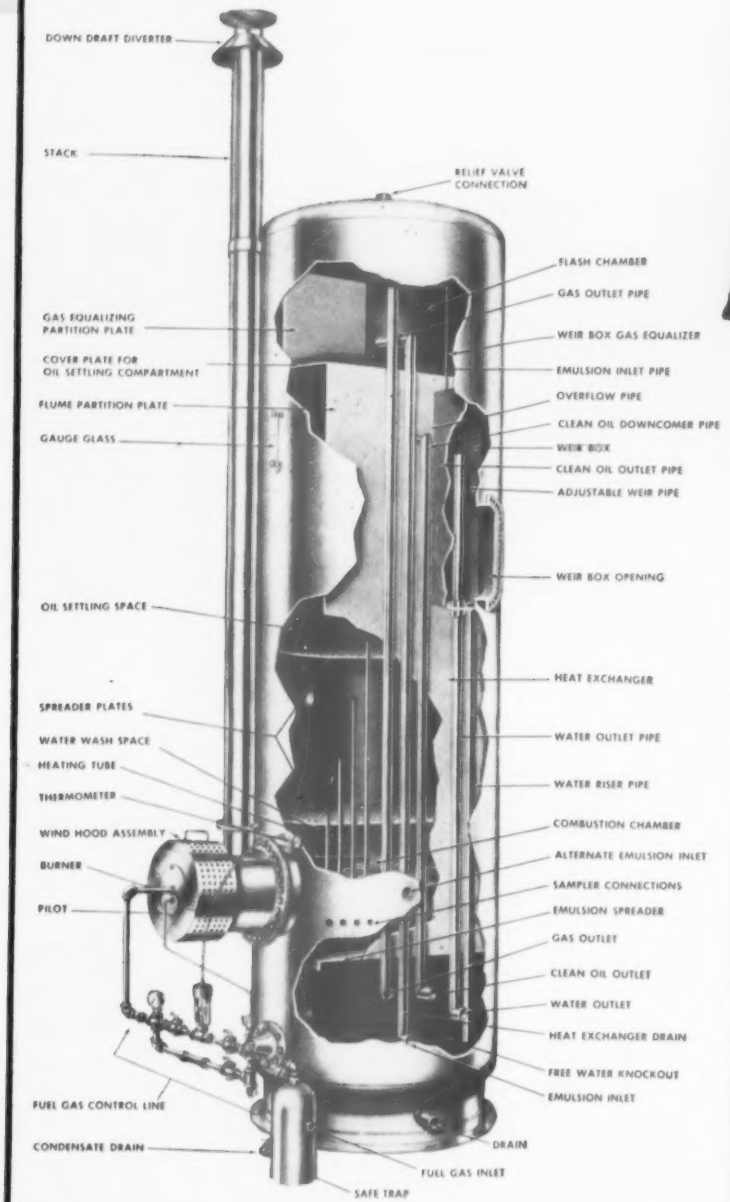
LPG CONTROLS by O-C-T

Oil Center Tool Co.

P. O. Box 3091 Houston, Texas

Export Representatives: Sterling Areas—Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas

NOW! YOU CAN FORGET TREATER TROUBLES IN COLD CLIMATES



8322

PARKERSBURG NEW WINTERIZED TREATER

We've designed this NEW WINTERIZED TREATER so that ALL PIPING, INCLUDING THE WEIR BOX, is inside the treater.

This means:

. . . the inlet and discharge pipes, rising to top of treater, reduce radiation loss, always a treater problem in cold climates.

. . . discharge water won't freeze because weir box and water discharge pipe are inside treater.

. . . easier housing of all controls because piping connections are grouped close to firebox.

. . . additional pre-heating of the emulsion as it rises through the inside inlet pipe to top of treater before spilling over and flowing down the flume.

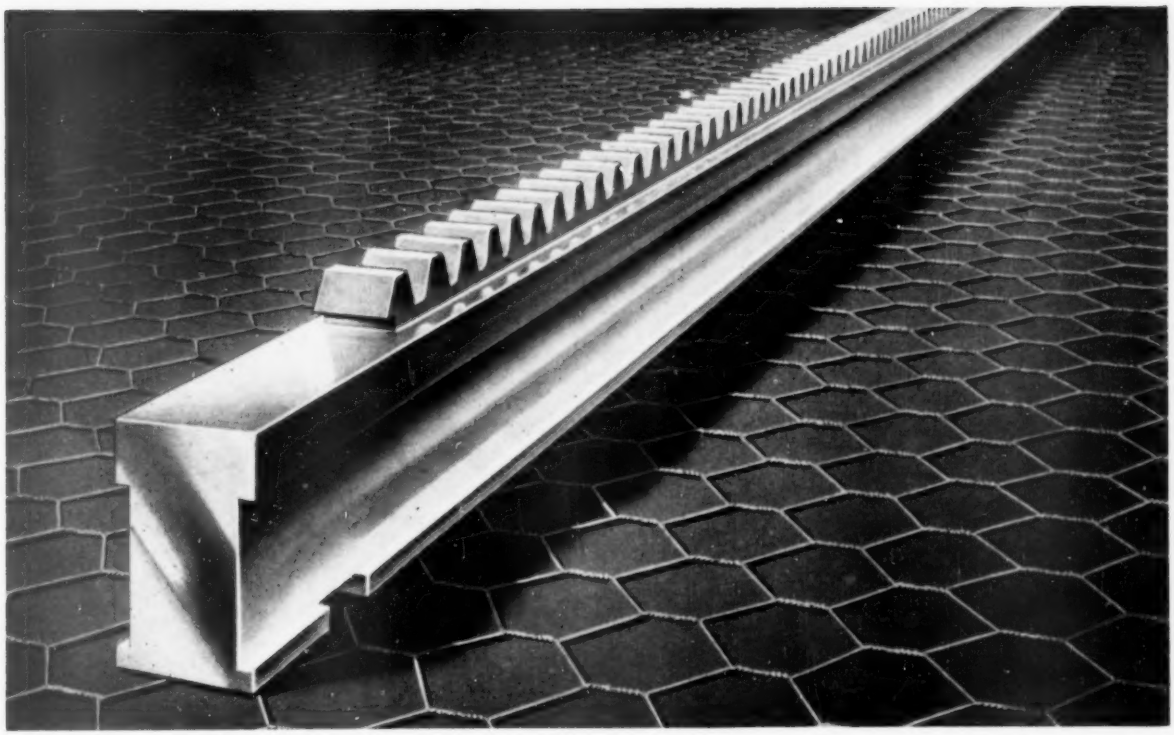
. . . the rearranged fire tube provides increased water capacity with less heat loss to the water.

Ask your Parkersburg Representative or write for complete details about our Winterized Emulsion Treater . . . the perfect solution to emulsion treating in cold climates.

PARKERSBURG
PRESSURE EQUIPMENT

HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • HYDRACEPTER • SCRUBBERS • TREATERS • HEATERS

Manufactured in Houston, Texas



7-foot Graph-Mo® steel rack hardened without distortion

THIS long, slim gear rack, part of a new Wean Equipment Company hexagon netting machine, started out as a problem child.

With the first steels tried, case hardening caused extreme distortion. And the few racks that did harden straight enough to be useable did not wear well.

As soon as the manufacturer turned to Graph-Mo®, one of four graphitic steels developed by the Timken Company, the problem vanished. Because Graph-Mo responds uniformly to heat treatment, the racks hardened without distortion. Heat-treating scrap was completely eliminated.

In addition, the Graph-Mo racks gave exceptional wear. First, the free graphite in Graph-Mo's structure acts as a built-in lubricant—reduces friction between the rack and the gears it engages. Second, diamond-hard carbides in Graph-Mo give it great resistance to abrasion and wear.

On top of all this, there was a 30% saving in machining time—Graph-Mo being easier to machine than ordinary tool steels.

For helpful information on the use of Graph-Mo and other graphitic tool steels for machine parts, dies, punches and gages, write for the 10th edition of "Timken Graphitic Steel Data Book". The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

HOUSES BUILT AT A FACTORY...

YOUR *BEST* BET FOR OIL FIELD HOUSING . . .

STURDYBILT Prefabricated Houses are precision built *at the factory.* Top grade, seasoned lumber is used exclusively; and each prefabrication section is made to fit with every other section.

You can choose from many standard designs that will fit every housing need, large or small. Whether you need one small lease house or an entire oil field camp, one purchase order takes care of plans, construction, transportation and erection. What's more your factory-built STURDYBILT houses can easily be moved from one site to another with little or no loss of material.

■ **WRITE FOR INFORMATION**

● **MANUFACTURERS OF SPECIAL MILLWORK: DISTRIBUTORS OF JOHNS-MANVILLE BUILDING MATERIALS; CURTIS WOODWORK**

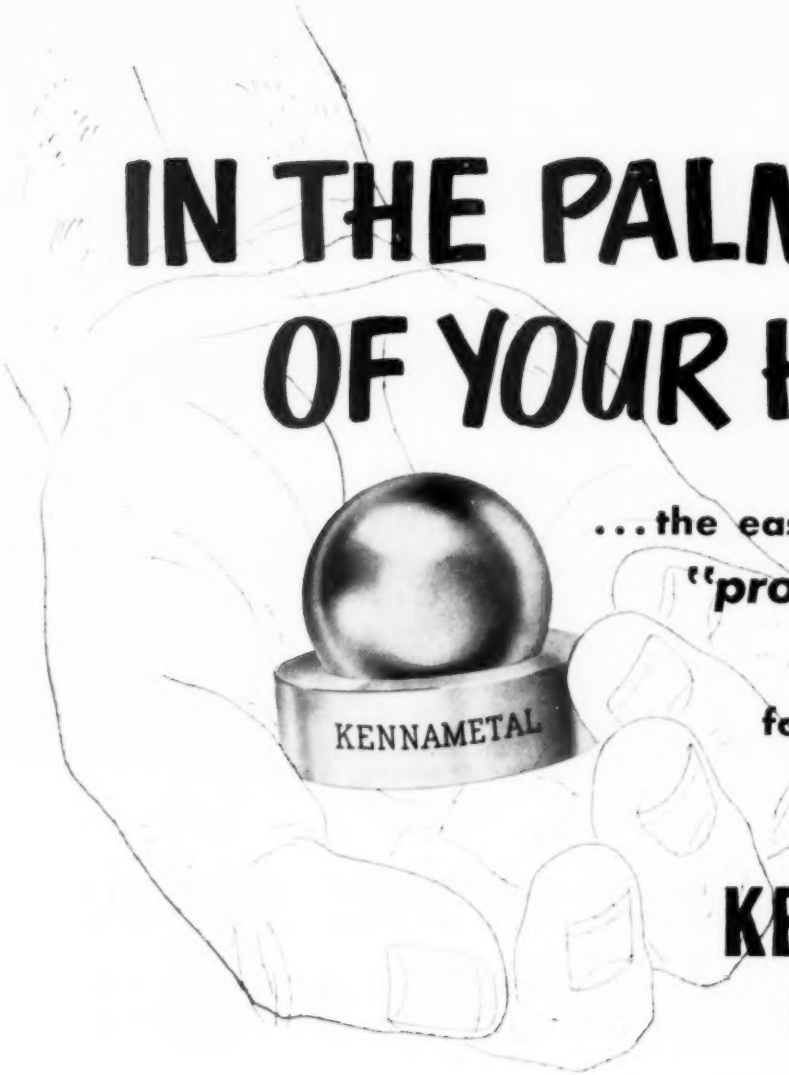
STURDYBILT

PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. ● TULSA, OKLAHOMA

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

IN THE PALM OF YOUR HAND!



...the easy answer to "problem" pumping—

for 2 to 5 times longer service use

KENNAMETAL* BALLS and SEATS

Small items, but *big factors* in reducing the risk of bottom hole valving failures, Kennametal Balls and Seats possess diamond-like hardness that assures more constant valving efficiency. They have unmatched resistance to abrasion and corrosion . . . last up to 5 times longer than "special" alloys in "problem" wells where flour sand cut fluids, hydrogen sulfides, and other corrosive agents are present. Round trips are less frequent . . . production volume increases.

Kennametal API Balls and Seats are available at leading supply stores, or from your pump manufacturer. Balls are furnished either regular, or lightweight (used where ball flutter, cage wear, or fluid pounding are present). Seats can be had either flat or with Monel rib.

*Registered Trade-Mark

KENNAMETAL

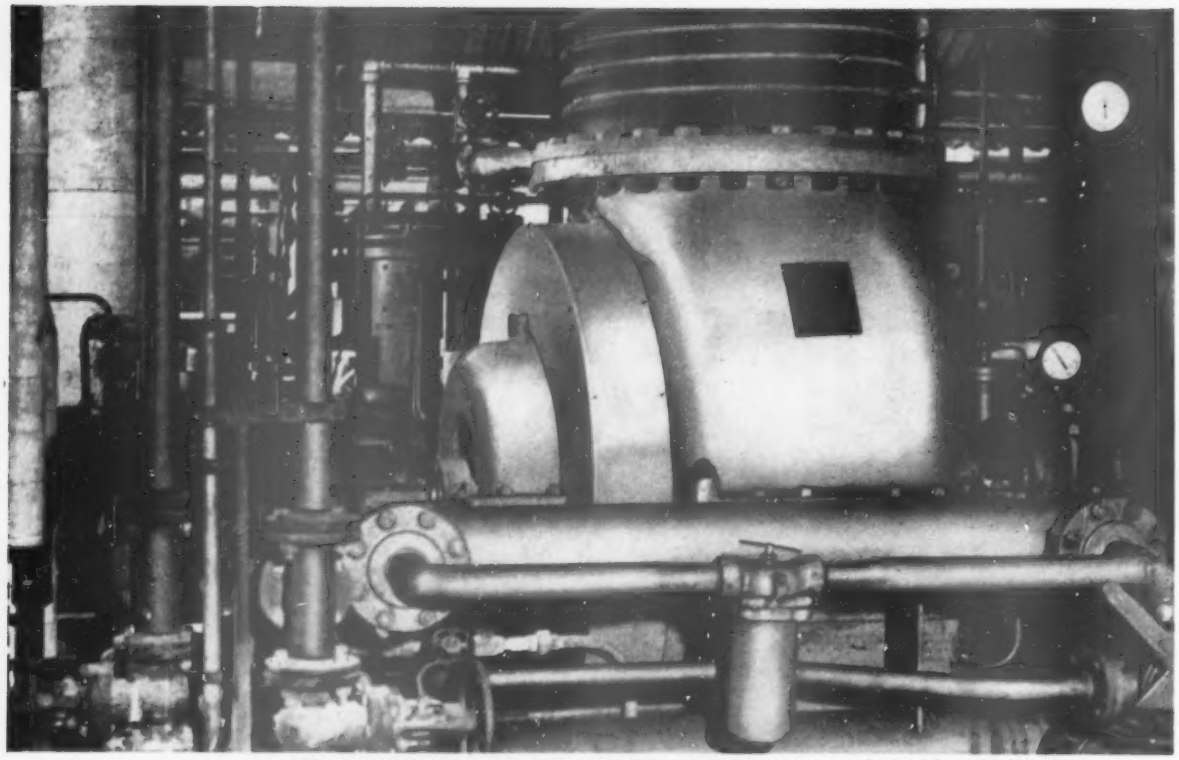
REDUCES THE RISK OF SUB-SURFACE VALVE FAILURE

Quality Sintered Carbide API Balls and Seats

Manufactured by

Kennametal Inc., Latrobe, Pa.

SOLD BY MAJOR PUMP MANUFACTURERS



LOW MAINTENANCE COSTS AND EXCELLENT STEAM ECONOMY are obtained from this Worthington high-speed turbine, one of two used to drive centrifugal blowers in this up-to-date refinery installation.

8000 rpm steam turbines operate on only 15 pounds inlet pressure

Worthington high-speed units at a Gulf Coast refinery drive centrifugal blower in cat cracker

• Steam at a pressure of 15 pounds is all it takes to power the two high-speed Worthington turbines that drive centrifugal compressors for the refining process in a cat cracker at a large Gulf Coast refinery.

Worthington steam turbines are ideally suited for blower or centrifugal compressor drives, since they are built in all sizes and speeds for the most economical unit performance. There's no need for costly speed increasing gears, either, and the turbine's adaptability to various governing arrangements allows precise control under all operating conditions.

Remember, the engineering of the drive is just as important as the engineering of the compressor or blower. Worthington's long experience in compressor-drive engineering is your assurance of getting exactly the right type and size drive for your needs. Write today for Bulletin 1966 to Worthington Corporation, Steam Turbine Division, Wellsville, New York. T.3.5

WORTHINGTON

A GREAT TEAM IN STEAM

Single-Stage Turbines • Multi-Stage Turbines • Turbine-Generator Sets • Feed Water Heaters • Boiler Feed Pumps • Surface Condensers

NO WELL SHOULD LOAF!

Sure-Seal is a registered Trade Mark of the Axelson Manufacturing Company.

How J&L tailor-assembles Axelson pumps

Any well will loaf – will fail to do its dead-level best – unless equipped with *precisely the right pump.*

The AXELSON Sure-Seal, stationary barrel with Top-Cup Hold-Down, may be exactly the right pump to wake up that loafer you have in mind. It does keep thousands of wells on their toes. It's a real work horse – a metal-to-metal pump with no cups to cut out.

Top-Cup Hold-Down

The Sure-Seal is a versatile pump, with a wide range of alternate parts and accessories. Your well may call for special barrel tubes hardened by a patented Axelson process, or Axelson Heavy-Duty Cages, or other special equipment. In assembling a Sure-Seal Pump for any given well, all alternate equipment is carefully considered by experienced J&L men.

Your J&L store will give you sound advice . . . will recommend the Axelson Pump that is basically right for your well, and will tailor-assemble that pump to yield the most oil for the least money.

No well should loaf. Call that J&L number now!

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION
SUPPLY DIVISION

Serving The United States and Canada
General Offices: TULSA, OKLAHOMA
J&L Tubular Products and Wire Rope

PESA
PARTNERS IN PETROLEUM PROGRESS

Motor Repair Service Wherever You Are

ALLIS-CHALMERS "Certified" SERVICE

Factory approved motor service in every industrial area from 101 Allis-Chalmers Certified Service Shops.

ALABAMA
Birmingham—Elec. Repair & Serv. Co.
Greenville—Mowbray Eng. Co.
Montgomery—Standard Electric Co.

ARIZONA
Bisbee—Copper Electric Co. Inc.
Phoenix—Daley Electric Company

CALIFORNIA
San Diego—Calif. Elec. Works
Los Angeles—Larsen-Hague Elec. Co.
Oakland—Pacific Elec. Motor Co.
T. L. Rosenberg Co.
San Francisco—Weidenthal-Gostiner Electric Works

COLORADO
Denver—Baker Electric Company

CONNECTICUT
Hartford—Charles H. Leppert
Waterbury—Elec. Motor Repair Co., Inc.

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Miami—Peninsular Armature Works
Tampa—Tampa Armature Works, Inc.

GEORGIA
Albany—Georgia Electric Co.
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Marion—Giles Arm. & Elec. Wks., Inc.
Mt. Vernon—Dawzer Electric Machinery Works, Inc.

INDIANA
Indianapolis—Scherer Electric Co., Inc.
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KANSAS
Salina—Cent. Kans. Elec. Mach. Co.
Wichita—Tarrant Electric Mach. Co.

LOUISIANA
New Orleans—Industrial Elec., Inc.
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MAINE
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Saginaw—Banning Elect. Prod. Corp.

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Duluth—Mielke Electric Works, Inc.
Minneapolis—Parsons Elec. Co.

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Vicksburg—Ludke Electric Co., Inc.

MISSOURI
Kansas City—Boese-Hilburn Elec. Co.
St. Louis—French-Gerleman Elec. Co.
Springfield—Springfield Elec. Serv. Co.

NEBRASKA
Omaha—Omaha Electrical Works

NEW HAMPSHIRE
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NEW MEXICO
Albuquerque—Electric Motor Company
Powell Electric Co.

NEW YORK
Buffalo—Robertson Electric Co.
Volland Elec. Equip. Co., Inc.
Flushing—Flushing Elec. Corp.
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Mt. Vernon—H. A. Schreck, Inc.
New York—Consol. Elec. Motor Co.
Rochester—Vanderlinde Elec. Corp.
Utica—Mather, Evans & Dighl Co.
Watertown—Watertown Elec., Inc.

NORTH CAROLINA
Charlotte—Southern Elec. Service Co.
Greensboro—Southern Elec. Serv. Co.
Rocky Mount—Hammond Elec. Co.

OHIO
Cincinnati—Cincinnati Elec. Equip. Electric Service Co.
Akron—A-C Supply Co.
Toledo—Romanoff Elec. Motor Serv.
Youngstown—Winkle Electric Co.

OKLAHOMA
Miami—Miami Armature Works
Oklahoma City—Southwest Elec. Co.
Tulsa—Smith-Milligan Electric Co.

OREGON
Eugene—Kalen Electric & Mach. Co.
Portland—Milwaukee Mach. Co.

PENNSYLVANIA
Johnstown—Universal Elec. Mfg. Co.
Osceola Mills—Mid-State Elec. Eng. Co.
Philadelphia—Elec. App. & Repair Co.
Pittsburgh—Penn. Elec. Coil Corp.
York—Industrial Electric Company

SOUTH CAROLINA
Greenville—Southern Elec. Serv. Co.
Spartanburg—Southern Elec. Serv. Co.

SOUTH DAKOTA
Sioux Falls—Electric Motor Repair

TENNESSEE
Columbia—Middle Tenn. Arm. Wks.
LaFollette—Standard Arm. Works, Inc.
Memphis—Indus. Elec. & Supply Co.

TEXAS
Amarillo—G. E. Jones Elec. Co.
Beaumont—Elec. Mach. & Repair Co.
Dallas—Industrial Elec. Equipment Co.
El Paso—B & M Machinery Co.
Fort Worth—Central Electric Co.
Houston—Ray A. Berentz Co.
Sweetwater—Sweetwater Electric Co.

UTAH
Salt Lake City—Diamond Electric Motor Repair

VIRGINIA
Richmond—Wingfield & Hundley
Roanoke—Virginia Armature Co.

WASHINGTON
Spokane—Lee F. Austin Company

WEST VIRGINIA
Charleston—Charleston Elec. Supply
Fairmont—West Virginia Armature Co. of Fairmont, Inc.
Morgantown—Galis Elec. Repair Co.

WISCONSIN
Baraboo—Utility Trans. & Equip. Co.
Green Bay—Beemster Electric Co.
Milwaukee—Dietz Electric Co.
Wausau—Electric Motor Service
Wisconsin Rapids—Staub's Elec. Wks.

Sold . . .
Applied . . .
Serviced . . .

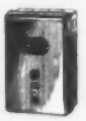
by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

ALLIS-CHALMERS CERTIFIED SERVICE SHOPS are independent service shops which have met rigid standards for ability, experience, equipment and business integrity. They use factory approved methods and parts and do your work promptly at a fair price.

Of course, Allis-Chalmers Certified Service Shops give good service on any electrical equipment, of any make. Tear out this ad and save it, or write the name of the A-C Certified Service Shop nearest you in your address book. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4197

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

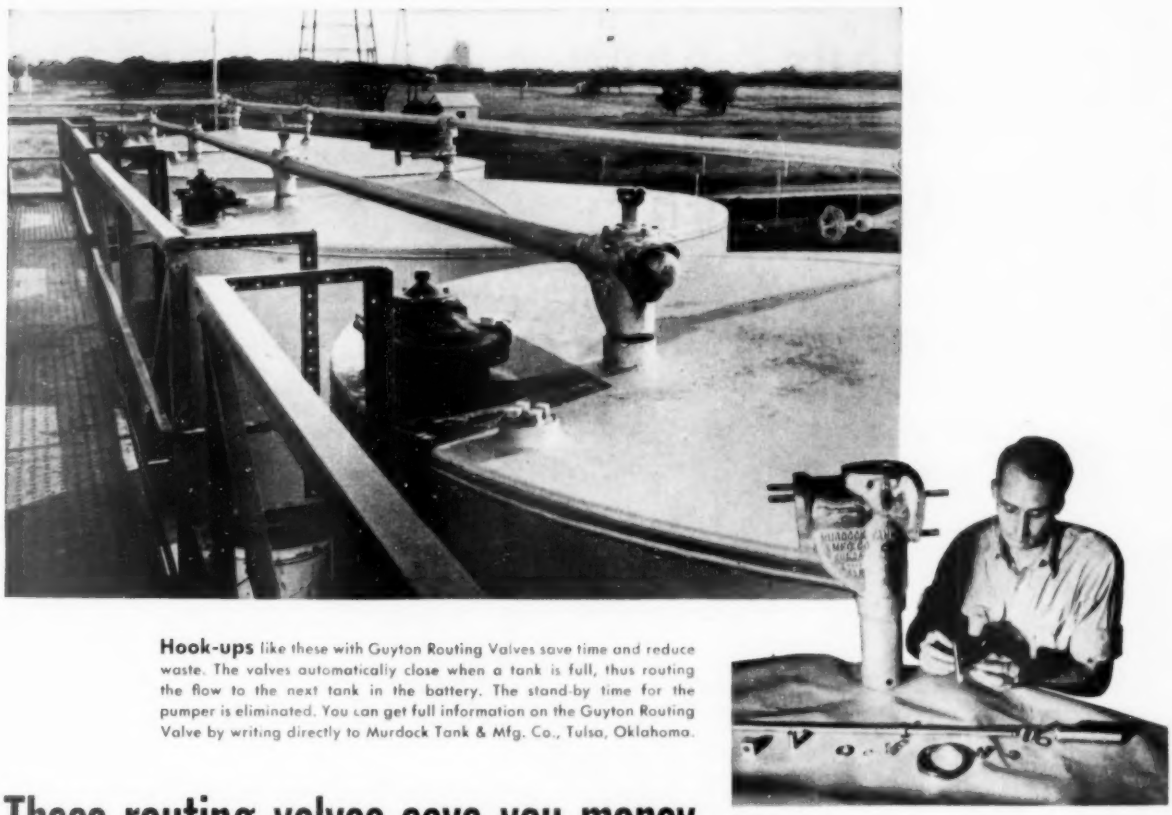


CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS



Hook-ups like these with Guyton Routing Valves save time and reduce waste. The valves automatically close when a tank is full, thus routing the flow to the next tank in the battery. The stand-by time for the pumper is eliminated. You can get full information on the Guyton Routing Valve by writing directly to Murdock Tank & Mfg. Co., Tulsa, Oklahoma.

These routing valves save you money ...on stock tank hook-ups

With Guyton Routing Valves you can save the unnecessary time and expensive car mileage normally involved in manually operating tank batteries on widely scattered leases.

Once the valves are set on the battery of tanks, the Guyton Valve automatically controls the flow of the oil from the well to the storage tanks. As each tank is filled, the valve closes and the oil is routed to the next tank.

When the last tank is filled the line is automatically closed. The only manual attention required is the resetting of the valves. Any tank can be by-passed by simply not setting the valve on that tank.

In addition to the savings in time and mileage, the Guyton Valve reduces waste and eliminates the fire hazard of overflowing tanks.

Monel used to meet severe conditions – The manufacturers of the Guyton Valve wanted a metal that would stand up against the destructive attacks of hydrogen sulfide, brine and entrained solids.

That's why they chose Monel for the working parts – for stems, valve seats, springs, washer bushings, and float assembly blocks and float arms. Monel offers protection against the severest oil field conditions because it combines high strength and toughness with an exceptional degree of resistance to corrosion, abrasion and wear.

Consult your distributor of Inco Nickel Alloys for the latest information on their availability from warehouse and mill. Remember, too – it always helps to anticipate your requirements well in advance.

And any time you run into problems involving metals for oil field use, we hope you'll write us. Inco's Technical Service or Corrosion Engineering Section may already have the answer handy. If not, they may be able to help you find it. Either way, there's no charge or obligation.

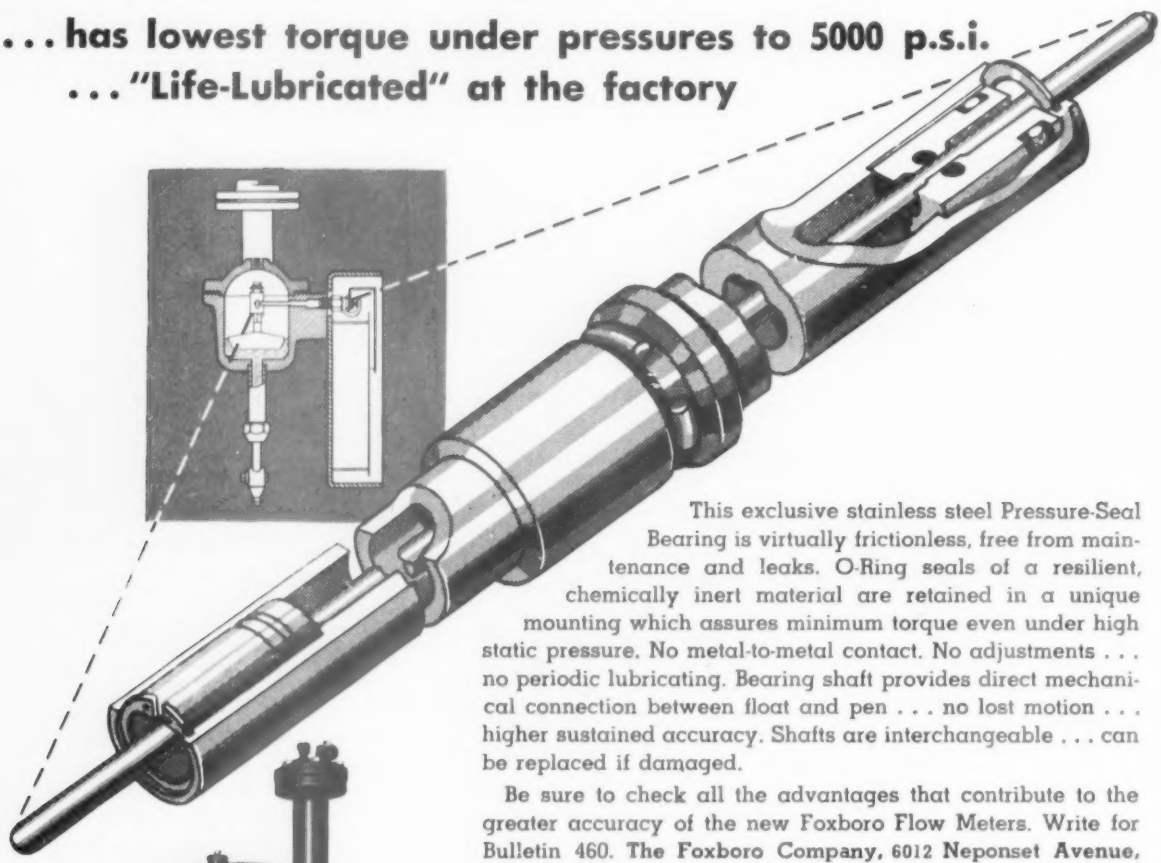
THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

Inco Nickel Alloys

MONEL® • "R"® MONEL • "K"® MONEL • "KR"® MONEL • "S"® MONEL • INCONEL® • INCONEL "X"® INCONEL "W"® • INCOLOY® • NIMONIC® ALLOYS • NICKEL • LOW CARBON NICKEL • DURANICKEL®

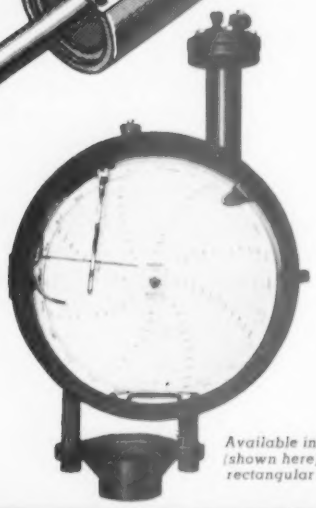
You've never seen a meter bearing as trouble-free!

...has lowest torque under pressures to 5000 p.s.i.
..."Life-Lubricated" at the factory



This exclusive stainless steel Pressure-Seal Bearing is virtually frictionless, free from maintenance and leaks. O-Ring seals of a resilient, chemically inert material are retained in a unique mounting which assures minimum torque even under high static pressure. No metal-to-metal contact. No adjustments . . . no periodic lubricating. Bearing shaft provides direct mechanical connection between float and pen . . . no lost motion . . . higher sustained accuracy. Shafts are interchangeable . . . can be replaced if damaged.

Be sure to check all the advantages that contribute to the greater accuracy of the new Foxboro Flow Meters. Write for Bulletin 460. **The Foxboro Company, 6012 Neponset Avenue, Foxboro, Massachusetts.**



Available in round (shown here) and rectangular cases.

OTHER NEW BASIC ADVANCES

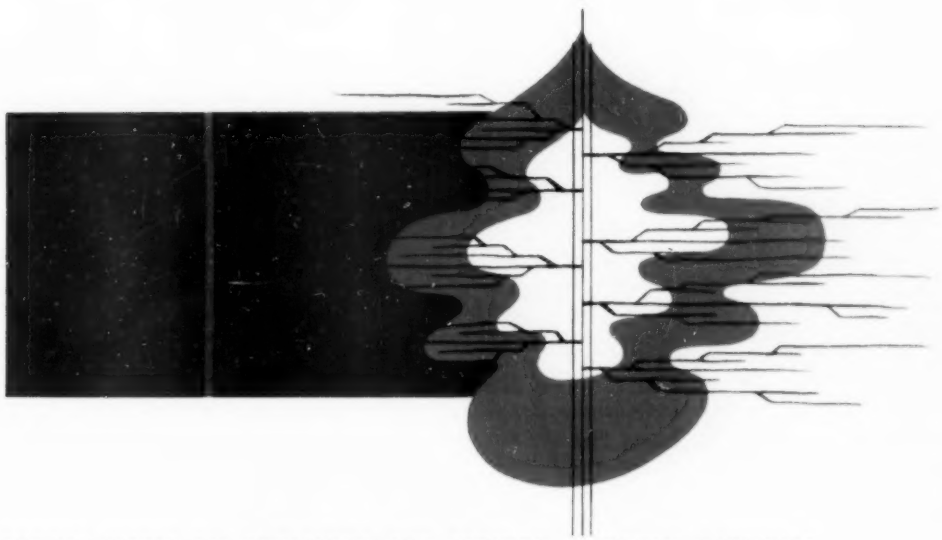
- **Precision Float Assembly** with stainless steel ball chain and collet-type clamp insures slip-proof, friction-free transmission of float motion to the recording pen.
- **Sure-Seal Check Floats** insure perfect seating; submerged in mercury to prevent frosting and fouling.
- **Union-coupled U-bend** eliminates gaskets; always lines up.
- **Calibrated Damping Plug** fully adjustable under pressure.

FOXBORO REG. U. S. PAT. OFF. **... First in FLOW METERS**

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

RESTORES ORIGINAL PERMEABILITY
TO PLUGGED PAY ZONES

HALLIBURTON'S MCA



REMOVES WATER-OIL EMULSIONS AND SHRINKS BENTONITE PARTICLES

Normal permeability becomes a reality again when this remarkable chemical compound removes the two chief causes of restriction to flow near the well bore: water-oil emulsions and blocking bentonitic materials.

Halliburton's Mud Cleanout Agent – an exclusive blend of Morflo and hydrochloric acid – removes these production blocks by actually breaking the emulsions and by shrinking water-swollen bentonite. Hydrogen from the HCl replaces sodium on the bentonite, causing sharp and lasting shrinkage of the particles. Morflo disperses the filter cake so particles can be flushed from the formation.

This effective chemical agent has achieved marked success in reviving dwindling producers, and has proved very beneficial when used prior to squeeze cementing. Expert analysis of formation and well characteristics is required to determine where and when this outstanding compound can best be used to restore original permeability.

Call on Halliburton's know-how – and MCA – to help restore normal permeability and increase production. Just phone your nearby Halliburton representative. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES

"Finest Thread Protection" means using either of these WECO Compounds. They both exceed the requirements for maximum thread protection . . . for minimizing galling . . . for sealing without freezing. WECO Compounds require no thinner, will not harden, are not affected by hot or cold weather.

Give your tool joints and drill collars the finest thread protection and they'll give you longer, better service.

NO-GALL 50% ZINC BASE

These who prefer a zinc base compound should specify NO-GALL. It contains more than 50% pure metallic zinc.

LO-TORK 50% LEAD BASE

If you want a lead base compound, specify LO-TORK. It contains 50% finely screened metallic lead.

PESA

It's Wise to Standardize with . . . WECO . . .

WELL EQUIPMENT MFG. CORP.

Division of Chiksan Company
HOUSTON 1, TEXAS
CHIKSAN COMPANY
Brea, Calif. Chicago 28, Ill. Newark 2, N. J.
CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

They Say—

U. S. Needs Foreign Oil Industry

"The imposition of import restrictions on petroleum would be damaging to the national welfare. It would destroy the flexibility which has been vital and necessary to this country in time of emergency and in keeping our oil-hungry economy adequately supplied during shortages of domestic supplies.

"Such restrictions would have a damaging effect on the economy of some of our best friends overseas. It must be remembered that petroleum plays a dominant role in the peacetime economy of most foreign producing countries. American oil companies contribute substantially to the revenue and foreign exchange needs of these countries.

"The fact is that this country needs both a healthy domestic oil industry and a healthy American-owned foreign oil industry. The balance between the two may at times appear to be uncertain, but the free play of economic forces is a far better balance wheel than governmental regimentation or control.

"We must deal with both our domestic and our foreign supplies of oil in such a way that their development continues unimpeded, and their production remains available to the free world as needed."

J. W. Foley, vice president and assistant to the chairman of the board of The Texas Co., in a statement before the Mineral, Materials, and Fuels Economic Subcommittee of the Senate Committee on Interior and Insular Affairs.

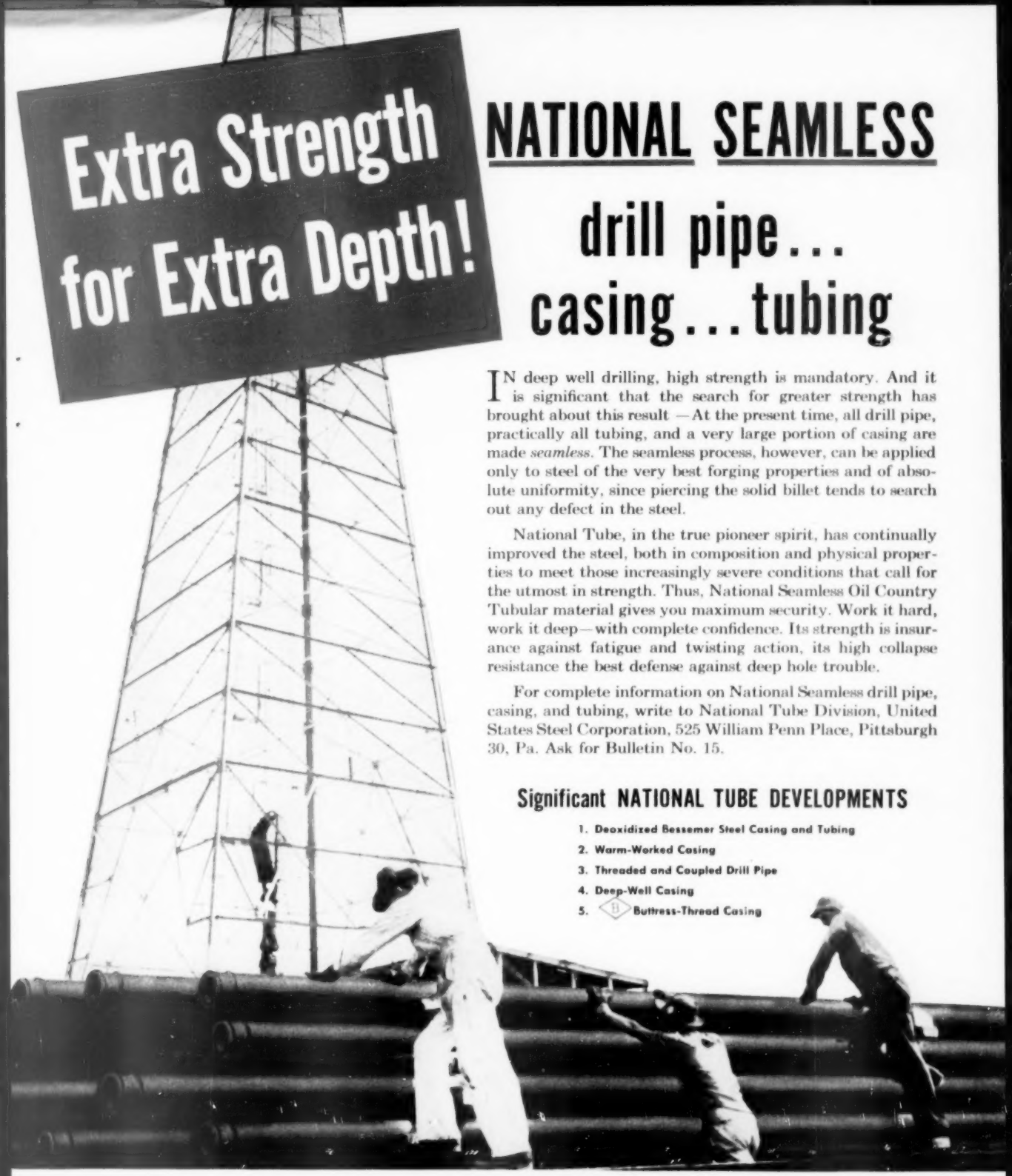
Tidelands Haven't Paid Off Yet

"Despite all the talk of the billions of dollars of buried treasure in oil awaiting discovery under the tidelands, the $32,376,060 received by the state . . . for drilling contracts on 415,000 acres of offshore lands was the most that has yet come into the coffers of the state's permanent school fund from that source.

"Most of the money Texas has realized from offshore oil has been in the form of bonuses paid for leases. Little has come yet from royalty on production; in fact, few of the wells drilled thus far have been producers.

"Here's hoping the lessees will tap some of those billions we've been hearing about. The more they get, the

Extra Strength for Extra Depth!



NATIONAL SEAMLESS drill pipe... casing... tubing

IN deep well drilling, high strength is mandatory. And it is significant that the search for greater strength has brought about this result —At the present time, all drill pipe, practically all tubing, and a very large portion of casing are made *seamless*. The seamless process, however, can be applied only to steel of the very best forging properties and of absolute uniformity, since piercing the solid billet tends to search out any defect in the steel.

National Tube, in the true pioneer spirit, has continually improved the steel, both in composition and physical properties to meet those increasingly severe conditions that call for the utmost in strength. Thus, National Seamless Oil Country Tubular material gives you maximum security. Work it hard, work it deep—with complete confidence. Its strength is insurance against fatigue and twisting action, its high collapse resistance the best defense against deep hole trouble.

For complete information on National Seamless drill pipe, casing, and tubing, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa. Ask for Bulletin No. 15.

Significant NATIONAL TUBE DEVELOPMENTS

1. Deoxidized Bessemer Steel Casing and Tubing
2. Warm-Worked Casing
3. Threaded and Coupled Drill Pipe
4. Deep-Well Casing
5. (B) Buttress-Thread Casing

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

NATIONAL SEAMLESS *drill pipe...casing...tubing*

USS

UNITED STATES STEEL

HOLD ANY PACKER DOWN

. . . With a Guiberson Hydraulic Anchor

The Type "H1" Hydraulic Anchor is recommended for use with all Guiberson production-type packers — or any other comparable production-type packer — as a positive means of holding the packer and tubing down while the well is pressured below the packer, as in acidizing or formation-fracture processes. It is also recommended for use in anchoring the tubing and packer in gas or water injection wells where the tubing pressure will exceed the casing pressure. The "H1" can be effectively used as a Hydraulic Anchor to keep the tubing from "breathing" in pumping wells having low working fluid levels.

Simplicity of design and completely automatic operation make the "H1" exceedingly easy-running, easy-pulling — it may even be run upside down without the slightest effect on its operation. Case hardened piston slips in Monel inserts assure positive action and maximum corrosion resistance. Piston slips operate independently and provide equal distribution of gripping force against the casing I.D. with no localized high pressure areas. This, coupled with a limited piston slip stroke, positively precludes swaging or damaging casing in any way. Piston slip gripping area is 100% effective in any weight casing within the anchor size range. "H1" anchors are individually tested and will hold any pressure the tubing will stand.

TYPE "H1"

THE
GUIBERSON
CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

more the school children of Texas will get."

From an editorial in the Houston Post.

Service Stations With No Service

"It isn't likely that you'll ever be driving your car in Moscow. But suppose that were the case — and you found yourself running low on gas and were in urgent need of finding a service station.

First of all, you might run entirely out before you could get your tank refilled. For, while Moscow is one of the great cities of the world in point of population, with some 5,000,000 inhabitants, it has only five . . . so-called service stations.

"But suppose you were lucky and reached one of the five stations in time. Smiling attendants wouldn't run out to check your tires, clean your windshield, attend to your battery, or any of the other things we take for granted here in America. Indeed, you'd have to fill your own tank, perhaps with gasoline of very dubious quality, and all the attendant would do would be to take your ration coupons and your rubles.

"It isn't at all remarkable that this should be the case in Moscow. For under Communism and other totalitarian doctrines, there is no competition and no free enterprise.

"The American service station, on the other hand, is the product of the most intense kind of competition—just as is everything else connected with the oil industry. And the result is the best products, the best service, and the lowest prices than human ingenuity can achieve."

Editorial in the Oil City (Pa.) Derrick.

CALENDAR

JANUARY

11-15 Society of Automotive Engineers, annual meeting and engineering display, Sheraton-Cadillac and Statler Hotels, Detroit.

12-14 National Constructors Association, annual meeting, Hotel Commodore, New York City.

18-20 Pipe Line Contractors Association, sixth annual convention, Shamrock Hotel, Houston.

18-22 American Institute of Electrical Engineers, winter general meeting, Hotel Statler and Hotel McAlpin.

25-28 Plant Maintenance & Engineering Conference, Hotel Conrad Hilton, Chicago.

27-29 Ninth annual symposium, "Instrumentation for the Process Industries," Texas A. & M. College, College Station, Tex.

25-28 Plant Maintenance & Engineering Show, International Amphitheatre, Chicago.

FEBRUARY

1-5 National Association of Corrosion Engineers, annual short course in corrosion, Washington State College, Pullman, Wash.

4 Instrument Society of America, ninth annual regional conference, Hotel Statler, New York City.

11-12 Western Petroleum Refiners Association, regional meeting, Hotel Beaumont, Beaumont, Tex.

22 American Association of Petroleum Geologists, Rocky Mountain section, annual meeting, Albuquerque, N. M.

26 Natural Gasoline Association of America, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

MARCH

1- 5 American Society for Testing Materials, spring meeting, Shoreham Hotel, Washington, D. C.

3- 5 American Petroleum Institute, Division of Production, Southwestern district, Rice Hotel, Houston.

4- 5 American Gas Association, transmission and storage conference, Jung Hotel, New Orleans.

8-10 American Institute of Chemical Engineers, Statler Hotel, Washington.

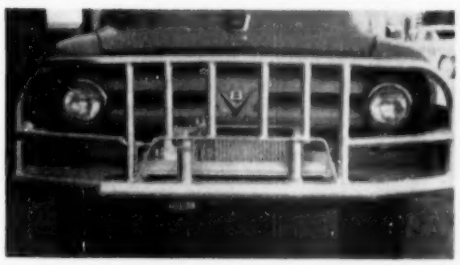
15-19 National Association of Corrosion Engineers, annual meeting, Municipal Auditorium, Kansas City, Mo.

17-19 American Petroleum Institute, Division of Production, Mid-Continent district, Biltmore Hotel, Oklahoma City.

23-April 1 American Chemical Society, annual meeting, Municipal Auditorium, Kansas City, Mo.

IT'S NEW

BRADEN MODEL MU7-16F FRONT MOUNTED TRUCK WINCH . . . .



NEW in DESIGN NEW in APPEARANCE NEW in PERFORMANCE

You wanted a truck winch that was fast operating as well as safe. This is it. The MU7-16F has a line speed most desirable for winching operations, and it's equipped with BRADEN'S famous OIL-COOLED, AUTOMATIC SAFETY BRAKE . . . the *safest truck winch brake ever produced.*

Winch can be installed with or without cutting front end grille of truck. Write for complete information on the NEW MU7-16F today.

- Rating: 15,000 Pounds
- Weight: 234 Pounds
- All Working Parts Enclosed
- Easy to Service
- Fits Any Make Truck
- Low Cost

BRADEN WINCH COMPANY

P. O. Box 547, Broken Arrow, Oklahoma

BRADEN Winches

"Wait!
..Don't

junk that old liner"

It's worth 35% at Mission

When Mission introduced Super-Service Liners with exclusive Satin Finish* in May, 1950, we provided the oil industry with **a better liner** in a competitive price range to match the long-life quality of Mission Pistons, Valves, Rods and Rod Packing.

Now, Mission has done it again! We can now provide you with reduced size, induction hardened **RENEWED LINERS with Satin Finish*** that will give new liner service at 35% less than new liner cost!

HERE'S ALL YOU DO: When your mud pump reduced size liners (see note) become worn and need replacing, just turn them in to your supply store.

HERE'S WHAT YOU GET: Your supply store will deliver to you a guaranteed Mission RENEWED Liner with Satin Finish* at 35% less than new liner cost. Mission RENEWED Liners are reworked both inside and out to new liner specifications.

HERE'S WHAT IT COSTS: Your old liner is worth 35% of the cost of a new Mission Liner of the same size. Thus, you get a guaranteed RENEWED MISSION LINER with SATIN FINISH* for only 65% of the cost of a new liner.

NOTE: There are a few makes of liners of special material that are not suitable for renewing.

PLACE YOUR ORDERS TODAY AT YOUR SUPPLY STORE FOR MISSION RENEWED LINERS WITH SATIN FINISH*.

*Trade Mark Registered U. S. Patent Office.

Guarantee

RENEWED Liners with Satin Finish carry the same satisfactory service guarantee as new Mission Super-Service Liners.

* Trade Mark, Registered U. S. Patent Office.

MISSION MANUFACTURING CO.

P. O. BOX 4209 • HOUSTON, TEXAS

Export Office: 30 Rockefeller Plaza, New York

Cinch combination for abrasion—H-F Tuff-Temper Rod Pumps with CHROME-PLATED PLUNGERS and HEAT-TREATED BARREL TUBES

We run Tuff-Temper barrel tubes through a special electronic heat-treating process that produces a wearing surface of virtual file hardness on the inside—and yet the outside is ductile and shock-resistant. After the hardening process the tubes are machine-straightened and the working surface is expertly honed and polished to a mirror finish.

Tuff-Temper plungers are precision machined from highest quality seamless steel, then heavily plated with hard chromium and centerless ground to extremely close tolerances for an exact fit in the barrel tube.

This combination of a heat-treated barrel and chrome-plated plunger is the best pump you'll find in the oil patch for long wearing qualities and for handling abrasive fluids. Tuff-Temper pumps are available in a full range of A.P.I. sizes and types from leading stores in all major producing areas. Heavy-duty pumps with double-thick barrel tubes, or regular wall tubes can be furnished. Your store or one of our factory representatives will be glad to give you complete details without obligation, and make recommendations for special installations.

H-F PUMPS

"Best Pumps in the Oil Patch"

H-F TUFF-TEMPER ROD PUMP

Harbison-Fischer Mfg. Co.

GENERAL OFFICES AND PLANT—FORT WORTH, TEXAS

Factory representatives in all major producing areas

29-31 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

APRIL

4- 6 Texas Independent Producers and Royalty Owners Association, Rice Hotel, Houston.

5- 7 American Society of Lubrication Engineers, Netherland-Plaza Hotel, Cincinnati.

6- 8 Petroleum Industry Electrical Association, annual convention and exhibit, Adolphus and Baker Hotels, Dallas.

8- 9 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Townsend Hotel, Casper, Wyo.

12-16 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, annual meeting, St. Louis.

13-15 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

14-16 National Petroleum Association, fifty-first semiannual meeting, Cleveland Hotel, Cleveland.

21-23 Natural Gasoline Association of America, thirty-third annual convention, Baker Hotel, Dallas.

26-28 Southern Gas Association, annual convention, Houston.

MAY

2- 4 Independent Petroleum Association of America, midyear meeting, Cosmopolitan Hotel, Denver.

3- 5 American Geophysical Union, thirty-fifth annual meeting, National Academy of Sciences, Washington, D. C.

6- 7 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Statler Hotel, Los Angeles.

10-12 American Petroleum Institute, Division of Transportation, Products Pipe Line Conference, Warwick Hotel, Philadelphia.

10-13 American Petroleum Institute, Division of Refining, midyear meeting, Rice Hotel, Houston.

17-19 American Petroleum Institute, Division of Marketing, midyear meeting, Cosmopolitan Hotel, Denver.

24-26 American Gas Association, production and chemical conference, William Penn Hotel, Pittsburgh.

27-28 Natural Gas and Petroleum Association of Canada, Prince Albert Hotel, Windsor, Ont., Canada.

31-June 5 American Petroleum Institute, Division of Production, midyear committee conference, St. Francis Hotel, San Francisco.

JUNE

3- 4 Pennsylvania Grade Crude Oil Association, thirty-first annual meeting, Hotel William Penn, Pittsburgh.

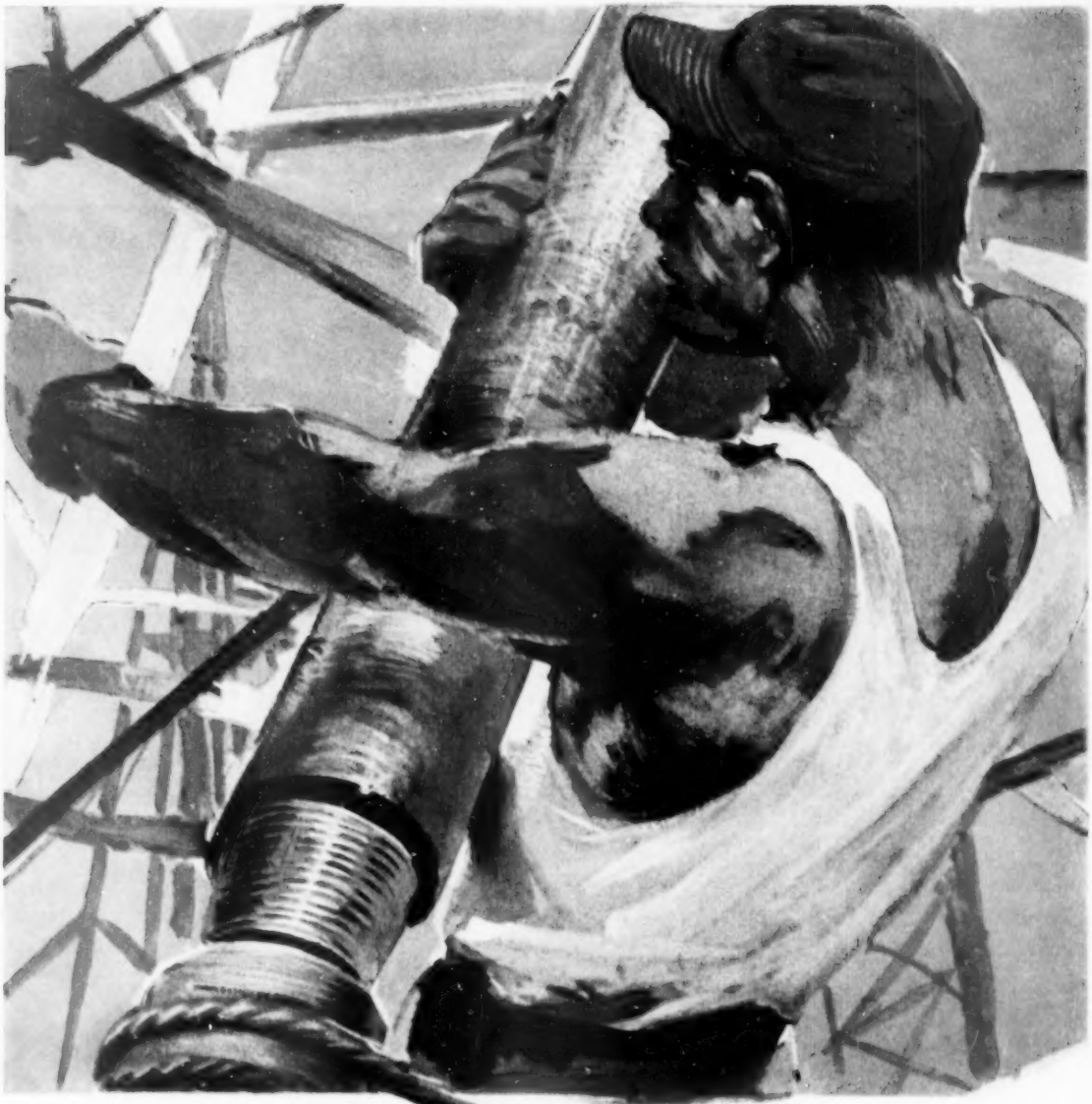
6-11 Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

13-18 American Society for Testing Materials, annual meeting and exhibits, Sherman Hotel, Chicago.

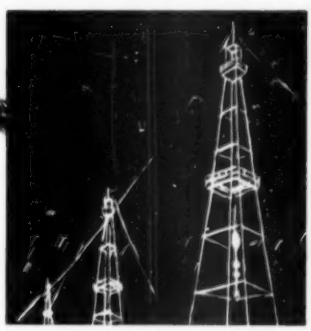
17-19 American Petroleum Institute, Division of Production, eastern district meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

20-24 Canadian Gas Association, Banff Springs Hotel, Banff, Alta., Canada.

27 July 1 Petroleum Equipment Suppliers Association, nineteenth annual meeting, Manoir Richelieu, Murray Bay, Que., Canada.



OIL



Oil is the basic raw material of modern industry. To live without oil would mean that we would have to revert to the age of the mail-coach, the Montgolfière, and the sailing ship. Only by means of the revolutionary invention of the Mannesmann pipe has it become possible to win oil from far below the earth's surface. Depths of 15,000 feet and more have been reached with the aid of Mannesmann seamless steel pipes. The stresses which these pipes have to bear, especially the casings, are extremely high. Mannesmann special casings for oil drilling have proved their reliability in oil fields throughout the world. Mannesmann supplies pipes, containers, apparatus and accessories of every type for the extraction, refining, transport and storage of oil and its by-products.

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Testing Multiple Zones	Magnesium—for fastest possible drillout—1 to 3 hours
Upper Zone Testing & Completion	Magnesium or Cast Iron
False Bottom	Cast Iron, usually
Nitro Tamping	Magnesium or Cast Iron
Squeeze Operations	Cast Iron, in view of the higher pressures
Casing Recovery	Magnesium or Cast Iron
Abandonment	Cast Iron—it will outlast the casing

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Both plugs run in on wire line, running fast through fluid, and give leak-proof packoff against pressures *up or down*—magnesium to 6,000 p.s.i., cast iron to 10,000 p.s.i. Both drill out quickly, with either rotary or cable tools.

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THE OIL AND GAS
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TULSA, OKLAHOMA

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JOURNALLY Speaking

Too Many Gags

THIS cartoon was run in our November 30 issue with the request that readers submit gag lines to replace the one we lost. The results overwhelmed us. We haven't space for half of them, and entries are still coming in.

A number of readers sent in several gags each, and quite a few came in anonymously. There were a great many variations on the themes of "hot oil," selling more than 100 per cent of a well, and professing to be some kind of an "expert" — which may be a commentary on oil men's thinking. Here are what we thought were the best, considering space limitations:

"No, Henry, no! 33/32nds are not the same as 8/8ths."—*K. D. Kirkpatrick, Missouri Pacific R. R. Co., St. Louis.*

"What rotten luck—getting an oil well after selling 22/8ths working interests."—*Maury M. Travis, U.S.G.S., Casper.*

"They can't putchu in here for drilling a dry hole. Where's Fort Knox anyhow?"—*C. J. Doyle, Telematic Corp., Chicago.*

"And I thought you were a tax expert." — *Ben E. Shelton, Kilgore, Tex.*

"What made you think a refrigerated tank truck kept it from being 'hot' oil?"—*R. H. Denman, Corpus Christi.*

"I told you not to stamp that last gasoline sample on specification."—*James Clark, Jr., Standard Oil Co., Lima, Ohio.*

"You and your friend in the state commission."—*Thomas A. Mathews, The Western Co., Midland, Tex.*

"I told you Marshall Zolonov was tough on geologists responsible for a dry hole."—*Robert Lindblom, Standard Oil Co., Taft, Calif.*

"So they don't guard the cores on that tight hole at night, eh?"—*Richard J. Frost, Shell Oil Co., Grand Junction, Colo.*

"You and your fancy ideas on whipstocking."—*Louis J. Zitnik, Kerr & Co., Laguna Beach, Calif.*

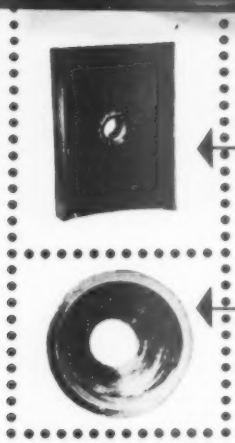
"So—they never gage 209 tank?" —*Ray Ruaroff, Sun Oil Co., Philadelphia.*

"Samples from our well! Ya dumb jerk, that was cod liver oil."—*Bob Finner, Santuros, Puerto Rico.*

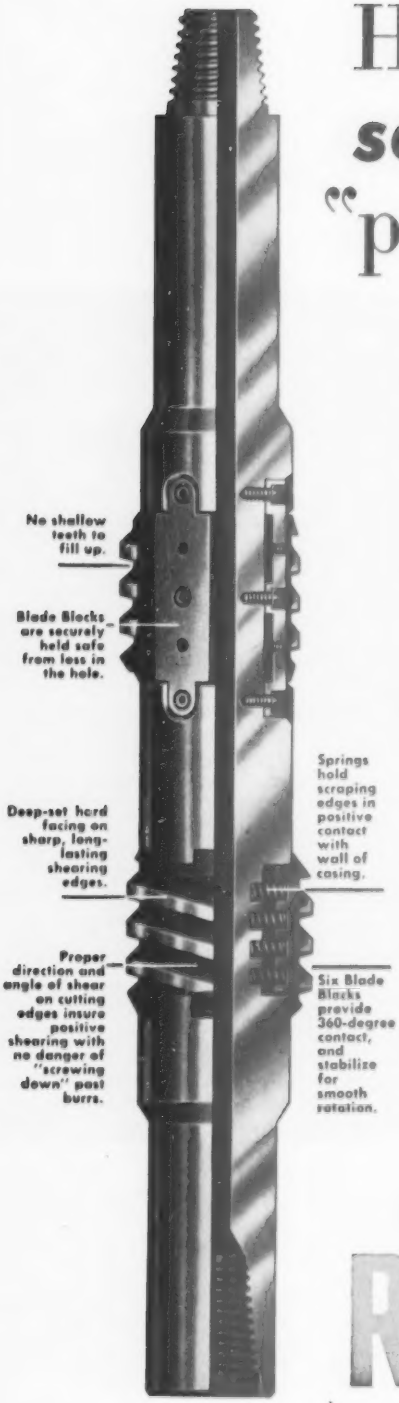
"What are you growling about? You got guaranteed security, ain't you?" —*John B. Schmitz, Sidney, Mont.*

Thanks also to contributors whose gags we couldn't use because of duplications, late arrival, lack of space, or (in a couple of instances) because this is a family magazine, including P. F. George, Dow Chemical Co., Midland, Mich.; Mary Virginia Bumgart, Sun Oil Co., Evansville; D. E. Keller, Jr., Baltimore; Joe Collins, Elmhurst, N. Y.; Earle McIlroy, St. Elmo, Ill.; H. D. Easton, Shreveport; George V. Dawson, Wheeling, W. Va.; E. L. Birmingham, Birmingham-Bartlett Drilling Co., Wichita; Edward L. Ingram, Atlantic Refining Co., Dallas; Arthur C. Knapp, Columbian Carbon Co., New York; Robert E. Steiner, Santa Maria, Calif.; Hobart C. Smith, E. V. McCollum & Co., Miles City, Mont.; Robert C. Paschall, Ventura, Calif.; M. H. Smith, Consulting Geologist, Bismarck, N. D.; C. Jensen, Shell Oil Co., Houston; Winnie Van Arsdel, Carter Oil Co., Shreveport; Elmer R. Lieberman, Dallas; K. C. Honn, Eunice, N. M.

—*Henry D. Ralph.*



Here's why
SCRAPING YOUR CASING
"pays off"


No shallow teeth to fill up.
Blade Blocks are securely held safe from loss in the hole.
Springs hold scraping edges in positive contact with wall of casing.
Deep-set hard facing on sharp, long-lasting shearing edges.
Proper direction and angle of shear on cutting edges insure positive shearing with no danger of "screwing down" past burrs.
Six Blade Blocks provide 360-degree contact, and stabilize for smooth rotation.

Unless the inside of your casing—the vital "working surface"—is clean and smooth, there is always a possibility of trouble in future operations. Burrs from gun-shot perforations, hardened cement or mud, and even mill scale are all dangerous when the time comes to run testers or swabs, or to set retainers or packers of any description.

The Baker Model "C" ROTO-VERT Casing Scraper removes undesirable obstructions from the inside of the casing, leaving it clean and smooth. Burrs or imbedded bullets are sheared away; cement, mud and scale are scraped away, so that any down-hole work can be safely done at once, or during the years to come.

SCRAPE WHILE DRILLING OUT

The ideal time to use the ROTO-VERT Casing Scraper is during the drilling out of cement, at which time it is run as a "follow-up" behind the bit. Thus in a single run you can also remove all hardened cement, mud, burrs and scale which might later damage swabs or testers, and cause packers or retainers to set prematurely—or never set at all.

EASY TO RUN—LOW-COST RENTAL

The Baker ROTO-VERT Casing Scraper is simple to run, and will effectively clean the inside of the casing *when either rotated or reciprocated* (vertical action). No service man is required, and the low rental cost is paid for many times over by freedom from future damage to bailers, swab rubbers and packers, as well as by the elimination of future delays and re-running expense.

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BAKER
ROTOVERT
CASING SCRAPER

PRODUCT NO. 620-C

1953 leaves some problems, but it was a pretty good year

THIS year of 1953, now bowing off the scene, may not have been as good for the oil industry as many operators may have wished, but it certainly hasn't been as bad as a lot of people feared it was going to be.

Taking the year as a whole, domestic demand has been around 5 per cent above the year before, drilling rigs have been operating at a high rate, a new record is being set in wells completed, and production of crude oil, natural gas, and gas liquids has been higher than ever. Refinery runs, too, have been up proportionately.

Construction has gone on apace in refineries and processing plants, and oil and gas pipe lines. There have been no strikes or labor shortages of consequence, no general financial stringencies. Shortages of materials are no longer a problem. Government restrictions imposed with the Korean outbreak have all disappeared.

Looking back 12 months it can be seen that a great many things the oil industry worried about then did not materialize. There has been no World War III, no general inflation, no business recession. The increase in demand, while less than in several prior years, held up better than many people feared a year ago. Prices of both crude and refined products are higher.

IN spite of all this, the industry isn't very happy as this year ends. This unhappiness appears to be due to two things. First, the wish that things had been even better. Two years of Korean-fired momentum put the industry in position to handle considerably more than a "normal" demand increase of 4 or 5 per cent, and the end of artificial stimulation brought a let-down feeling.

A second cause of unhappiness is the fear that things are going to be less good in the future. In view of 1953's unmaterialized fears, this pessimistic attitude seems rather groundless.

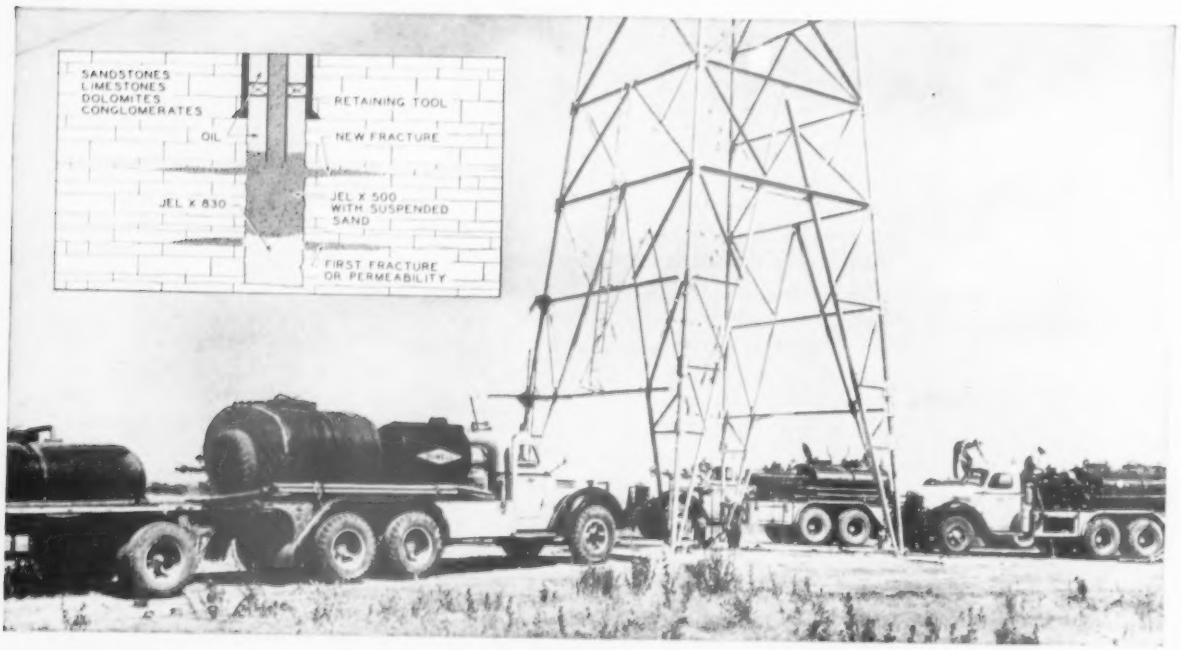
Of course, things could go all to pot, but there is nothing on the horizon to cause a rush for the storm cellars. Forecasts for 1954 are currently issuing from many sources, and their consensus is that most lines of business activity will suffer only slight declines, if any, and that the outlook for oil is a further increase in demand.

CERTAINLY 1953 bequeaths the industry some problems, the foremost probably being overcapacity and the potentialities for increased foreign competition, but it also leaves the industry in pretty good shape to cope with them.

Average out 1953's balance sheet—offset the bad things that might have happened but didn't, against the things that could have been better but still were pretty good—and you can look back on 1953 as not half bad, not bad at all. Just about a typical oil year, in fact.

FIXAFRAC—TEMPORARY PLUGGING SERVICE—AIDS IN MULTIPLE FRACTURING TREATMENT

Production boosted from 2.3 to 65 BOPD; Fixafrac used to divert Stratafrac stages into different zones



Initial production from this well, after acidizing, was 50 barrels of oil per day. It declined over an 18-year period until production had fallen to 2.3 BOPD.

At this point, the operator decided to call in Dowell to determine how to increase production. Dowell's recommendation: a multiple fracturing treatment consisting of 1500 gallons of Stratafrac material and 300 gallons of Fixafrac material.

Dowell engineers performed the service, using Dowell trucks, equipment and fracturing materials. As a result of the treatment, the well swabbed 3½ barrels of oil per hour for 7 hours, after treating materials had been recovered. On pump, the well produced 65 BOPD.

Fixafrac is a temporary plugging service used between stages of Dowell fracturing and acidizing treatments to divert treating fluids into different sections. The material used in Fixafrac service, Jel X 830, carries suspended solids which react after treatment causing the material to liquefy and flow back freely to the well bore. No jel-breaker solution is needed following the treatment.

If you would like to know more about Fixafrac service, or any of the many other Dowell oilfield services, call the nearest Dowell office or write to Tulsa, Dept. L-11.

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"First in Oilfield Acidizing . . . Since 1932"

Look to DOWELL
FOR OIL INDUSTRY CHEMICAL SERVICE

THIS WEEK... ...IN THE NEWS

INTERNATIONAL — Tentative plan for marketing of Iranian oil worked out in London by top representatives of eight major companies. . . . In Teheran, Parliament is dissolved in move toward assuring approval of agreement, when reached, on reopening of nationalized properties. . . . ¶Saudi Arabia asks bids on ammonium sulfate and dry-ice plant to operate on natural gas, the first important commercial use of gas in the Middle East. . . . ¶Australians wax enthusiastic about first commercial discovery of oil on the continent, begin thinking out loud of petrochemical and plastic industries. . . . Oil-company executive announces creation of $10,000,000 fund to develop field found by wildcat. . . . ¶First deep wildcat for Israel is spudded near southwest end of Dead Sea. . . .

PROCESSING — Catalytic reforming comes into its own with indications United States refinery reforming capacity will triple during 1954. . . . Survey shows 43 cat reforming units now in operation have a combined capacity of 200,000 bbl. daily. . . . Another 51 units under construction or planned for 1954 will boost that capacity to about 600,000 bbl. per stream day. . . . ¶American Cyanamid submits the top bid offered for the Government's ammonia plant at Louisiana, Mo. . . . Five other bids submitted but none for the entire facility which includes coal-hydrogenation and gas synthetics plants. . . . Great Northern Oil Co. discloses plans for a 25,000 bbl. daily refinery in Minnesota to process a 10-year committed supply of Saskatchewan crude. . . .

WORLD'S FIRST ocean-going tanker designed to carry high-density liquid chemicals in bulk is the Marine Dow-Chem, scheduled for completion early in 1954. The novel ship, shown here during launching, was built for Marine Transport Lines, Inc., and will be operated under charter to Dow Chemical Co. The 16,200-ton deadweight vessel has segregated tank, piping, and venting arrangements to prevent contamination of the cargo, which may consist of as many as 11 chemicals simultaneously.

PIPE LINES—First Alberta crude to reach Sarnia refineries this week through the world's longest oil trunk line from Edmonton, Alta. . . . Testing difficulties on the final 645-mile Lakehead link of the 30-in. line delayed deliveries, once scheduled for December 1. . . . Initial shipments will average 100,000 bbl. daily. . . . ¶Oklahoma Mississippi River Products Line, Inc., pays Sunray Pipe Line Co. $2,000,000 for 85 miles of 8-in. products line from Allen through Bristow to Drumright, Okla. . . . ¶Contractors halt work for the winter on Gulf Interstate's 860-mile system from the Louisiana Gulf Coast to Boyd County, Kentucky, with about 200 miles of the line left to complete. . . .

TRENDS—Rotary rigs operating in the United States averaged about 2,700 rigs since midyear compared with 2,521 for the same weeks last year. . . . In contrast, rigs for the first half averaged 2,530 or about 230 rigs less than for the first half of 1952. . . . All of the gain in well completions has been in the last half of the year.

ACTIVITY — Production of crude and lease condensate averaged 6,253,750 bbl. daily for week ended December 19, up 7,500 bbl. daily. . . . ¶Total well completions for the week decreased 57 wells to 1,049. . . . ¶Wildcat completions increased 19 to 234. . . . ¶Rotary rigs operating in the United States decreased 35 rigs during week ended December 21 to 2,885. . . .

PRODUCTION—Texas Railroad Commission flashes green light to producers in Spraberry Trend Area field in West Texas to resume full-scale production. . . . Commission acted on testimony by representatives of pipe lines and gasoline plants in the area that such facilities will be adequate by the first of the year to handle all casing-head gas produced with crude under January's 17-day schedule. . . . Major portion of sprawling field has been shut in by commission order for past 9 months for gas waste. . . .

Cat Reforming Boom Is On

- Record building program will triple U. S. refinery reforming capacity next year
- 43 units with charge capacity of 200,000 bbl. daily now in operation
- 51 more using one of 10 processes are due to be on stream by end of 1954

George Weber

THE coming year will be a big one for catalytic reforming. Capacity in United States refineries will probably increase threefold within the next 12 months. The record construction program now under way reflects an industry-wide acceptance of this process for upgrading straightrun naphthas to high octane gasoline blending stocks.

A survey at the end of 1953 shows that a total of 43 cat reforming units with a daily charge capacity of nearly 200,000 bbl. are now in operation. On contract are 51 more units whose total rated capacity is 435,000 bbl. per day. With few exceptions, these units will be placed on stream some time during 1954.

It is difficult to project actual cat reforming capacity a year in advance for two reasons. Completion schedules on some of the larger units cannot be fixed exactly at this time. Additional smaller units, which are being contracted continuously, can be installed in less than a year. Hence, the tentative projected capacity for December 31, 1954, may be placed at about 600,000 b.p.s.d.

THESE MAMMOTH REACTORS are typical of the installations that have accounted for the growth of catalytic reforming in United States refining. The four high-pressure reactors are the largest ever constructed for any Platforming unit and are on a new UOP Platformer at Shell's Houston refinery.

Ten processes . . . The first accompanying table lists the individual units, by process which are operating, contracted and under construction. Platforming, licensed by Universal Oil Products Co., leads the list with over half of the total units and roughly 53 per cent of total charge capacity. This fixed-bed operation employing a platinum catalyst saw its first commercial application over 4 years ago. In addition to the domestic units, a total of 17 Platforming units are operating or building in 10 foreign countries at the present time.

Second in total current capacity, are the fixed-bed Hydroforming units, most of which were built during World War II for the synthesis of toluene and other aromatics. This process, using a molybdena-on-alumina catalyst was licensed by the M. W. Kellogg Co. and Universal Oil Products Co. The first cat reforming process, it has been modernized in the fluid Hydroforming process, licensed jointly by Kellogg, Standard Oil Co. (N. J.), and Standard Oil Co. (Ind.).

Thermofor catalytic reforming, a moving-bed process developed and licensed by Socony-Vacuum Oil Co., Inc., employs a synthetic chromia-alumina bead catalyst. Platinum catalyst is used in four fixed-bed processes, three of which incorporate regeneration facilities. Catforming is licensed by the Atlantic Refining Co., Ultraforming is a development of Standard Oil Co. (Ind.), Houdriforming is Houdry Process Corp.'s process and the Sinclair process uses a catalyst termed RD-150, jointly developed by Sinclair Refining Co. and Baker & Co., Inc.

Cycloversion, employing a natural bauxite catalyst, is licensed by the

Catalytic Reforming Units in Operation or Contracted

PLATFORMING

Company and location—	Charge capacity, B.P.S.D.
Atlas Processing Co., Shreveport, La.	*4,440
Aurora Gasoline Co., Detroit	†7,500
Aurora Gasoline Co., Elsie, Mich.	†1,500
Bell Oil & Gas Co., Grandfield, Okla.	†2,200
California Oil Co., Perth Amboy, N. J.	†10,700
Coltex Refining Co., Colorado City, Tex.	†1,500
Continental Oil Co., Lake Charles, La.	‡6,000
Continental Oil Co., Ponca City, Okla.	†5,000
Cosden Petroleum Corp., Big Spring, Tex.	‡4,500
Eastern States Pet. Co., Inc., Houston	‡5,600
Elk Refining Co., Falling Rock, W. Va.	1,500
Great Southern Chemical Corp., Corpus Christi, Tex.	††4,000
Gulf Oil Corp., Philadelphia, Pa.	†16,000
Gulf Oil Corp., Port Arthur, Tex.	†29,000
Gulf Oil Corp., Toledo	†10,000
Johnson Oil Refining Co., Cleveland, Okla.	1,800
Kendall Refining Co., Bradford, Pa.	1,500
McMurrey Refining Co., Tyler, Tex.	†5,000
McNutt Oil & Refining Co., Brickland, N. M.	650
Mid-West Refineries, Inc., Alma, Mich.	2,200
Old Dutch Refining Co., Muskegon, Mich.	2,700
Onyx Refining Co., Hawley, Tex.	†650
Pana Refinery Co., Pana, Ill.	†650
Petroleum Specialties, Inc., Flat Rock, Mich.	1,000
Phillips Petroleum Co., Sweeney, Tex.	†16,000
Phillips Petroleum Co., Borger, Tex.	†7,000
Pontiac Refining Corp., Corpus Christi, Tex.	†5,000
Premier Petroleum Co., Fort Worth	1,700
Quaker State Oil Ref. Corp., Oil City, Pa.	†1,500
Republic Oil Ref. Co., Texas City, Tex.	††5,500
R J Oil & Ref. Co., Inc., Princeton, Ind.	†600
Rock Island Ref. Corp., Rock Island, Ind.	†1,400
Roosevelt Oil & Ref. Corp., Mt. Pleasant, Mich.	‡1,800
Rothschild Oil Co., Santa Fe Springs, Calif.	1,000
Shell Oil Co., Anacortes, Wash.	†8,000
Shell Oil Co., Houston	‡16,000
Shell Oil Co., Martinez, Calif.	†5,000
Shell Oil Co., Wilmington, Calif.	‡3,300
Shell Oil Co., Wood River, Ill.	†16,000
Shell Oil Co., Wood River, Ill.	‡4,000
Skelly Oil Co., Longview, Tex.	1,800
Standard Oil Co. of Calif., El Segundo, Calif.	‡12,100
Standard Oil Co. (Ohio), Lima, Ohio	†12,000
Sun Oil Co., Toledo, Ohio	†15,000
Sunray Oil Corp., Duncan, Okla.	†5,000
Taylor Oil & Gas Co., Port Isabel, Tex.	4,250
Taylor Oil & Gas Co., Corpus Christi, Tex.	5,250
The Texas Co., Amarillo, Tex.	†4,800
The Texas Co., Westville, N. J.	††1,970
The Texas Co., El Paso, Tex.	†3,300
The Texas Co., Port Arthur, Tex.	†20,000
Union Oil Co. of Calif., Wilmington, Calif.	†14,500
Wilcox Oil Co., Bristow, Okla.	1,500
Undisclosed	†500
Undisclosed	†650

FIXED BED HYDROFORMING

Company and location—	Charge capacity, B.P.S.D.
Continental Oil Co., Ponca City, Okla.	†3,300
Humble Oil & Ref. Co., Baytown, Tex.	‡27,000
Pan American Ref. Corp., Texas City, Tex.	‡7,500
Pure Oil Co., Toledo, Ohio	5,000
Standard Oil Co. of Calif., Richmond, Calif.	‡12,500
Standard Oil Co. (Ind.), Whiting, Ind.	‡14,000

FLUID HYDROFORMING

Cities Service Ref. Corp., Lake Charles, La.	†15,000
Cities Service Oil Co., East Chicago, Ind.	†12,500
Pan-Am Southern Corp., Destrehan, La.	2,000
Standard Oil Co. (Ind.), Whiting, Ind.	†30,000

THERMOFOR CATALYTIC REFORMING

General Petroleum Corp., Billingham, Wash.	†5,000
General Petroleum Corp., Torrance, Calif.	†17,000
Magnolia Petroleum Co., Beaumont, Tex.	†17,000
Socony-Vacuum Oil Co., Inc., Augusta, Kan.	†3,000

CATFORMING

Anderson-Prichard Oil Corp., Cyril, Okla.	1,000
Atlantic Refining Co., Philadelphia	†12,000
Atlantic Refining Co., Port Arthur, Tex.	†8,000
Douglas Oil Co. of Calif., Bakersfield, Calif.	†2,500
Husky Oil Co., Cody, Wyo.	1,000
Malco Refineries, Inc., Prewitt, N. M.	750
McBride Refining Co., Inc., La Blanca, Tex.	1,000
Mid-Continent Pet. Corp., Tulsa	†7,500
Mohawk Petroleum Corp., Bakersfield, Calif.	†2,500
Union Oil Co. of Calif., Cut Bank, Mont.	†600
United Refining Co., Warren, Pa.	2,500

ULTRAFORMING

Pan American Ref. Corp., Texas City, Tex.	†21,000
Pan-Am Southern Corp., El Dorado, Ark.	†6,800
Standard Oil Co. (Ind.), Sugar Creek, Mo.	†9,000

HOUDRIFORMING

Ohio Oil Co., Robinson, Ill.	†8,000
Petrocarbon Chemicals, Inc., Irving, Tex.	††1,000
Sun Oil Co., Marcus Hook, Pa.	‡10,000

SINCLAIR REFORMING

Pure Oil Co., Newark, Ohio	†3,000
Sinclair Ref. Co., Marcus Hook, Pa.	†16,000

CYCLOVERSION

R. Lacy, Inc., Big Sandy, Tex.	1,000
National Coop. Ref. Assn., McPherson, Kans.	1,000
Roosevelt Oil & Ref. Corp., Mount Pleasant, Mich.	3,000
Shallow Water Ref. Co., Shallow Water, Kans.	1,500
Sinclair Ref. Co., Hartford, Ill.	6,000
Wisconsin Oil Ref. Co., Inc., Sheboygan, Wis.	1,000

*500 bbl. per day natural benzene extracted from natural gasoline and cycle product feed stocks. †Contracted or under construction. ‡Operating or designed to operate wholly or partially for production of aromatic chemicals. ††Petrochemical company, to process purchased naphtha stocks for aromatics.

Perco Division of Phillips Petroleum Co. By altering processing conditions, this process is used for reforming of naphtha fractions, catalytic cracking of gas oil or desulfurization of distillate stocks. A total of 34 Cycloversion units are in operation in the United States.

The listing of Cycloversion units shown here comprises those units reported in reforming service by refiners replying to The Oil and Gas Journal's 1953 Refining Survey. A tenth cat reforming process termed Hyperforming, has been developed by Union Oil Co. of California. This process will use a cobalt molybdate catalyst in a moving bed. No commercial units have been contracted to date.

Bigger units coming . . . The summary of cat reforming activity, shown in the second table clearly shows the trend toward larger units. The early postwar adoption of cat reforming was characterized by the building of many small units by independent refiners. As a result the average size of operating units built since the war is about 3,400 b.p.s.d. By contrast, the average capacity of all cat reforming units now contracted but not yet in operation, is 8,500 b.p.s.d.

This reflects the entry of the major oil companies into the catalytic reforming field. Having relied mainly on high catalytic cracking and thermal reforming capacity, many large companies are now engaged in building a number of major cat reforming units. Examples are Indiana Standard and subsidiaries adding 68,800 b.p.s.d., Gulf Oil Corp. building 55,000 b.p.s.d., Socony-Vacuum and affiliates, 42,000 b.p.s.d., Shell Oil Co. adding 44,000 b.p.s.d. and The Texas Co., 40,070 b.p.s.d.

When this new capacity comes on stream, the octane potential of domestic motor fuel will rise to a marked extent. Not all reformers are engaged or will engage in the upgrading of naphtha stocks for octane exclusively. Of the total number of currently operating units, about 127,600 b.p.s.d. in charge capacity are used wholly or in part for the production of benzene, toluene,

xylenes and other basic aromatics for aviation gasoline blending and chemical manufacture. An additional 10,500 b.p.s.d. in units under construction are designed for this use.

Aromatics in balance . . . Since reformers equipped with facilities for separating aromatics from reformate may be altered for octane and for aromatics, it is difficult to specify a fixed total capacity engaged in aromatics manufacture at any time. In addition, some units operating mainly for fuel upgrading, also produce some aromatics which are separated, and conversely, aromatics operations yield byproduct streams which are blended to gasoline.

It is significant, however, that a very small fraction of new capacity still under construction is designed for aromatics manufacture. This reflects the fact that the Government's goal of capacity for 375 million gallons of benzene per year has nearly been reached—mainly by the installation of numerous cat reformers plus the continued operation of a number of war-built units.

Toluene consumption, tied mainly to government TNT manufacture, is currently in fair balance with production, and reduced defense activity would return that chemical to a position of oversupply similar to that encountered following the war. Xylenes enjoy a growing market as solvents, and comprise an important building block for synthetic fibers.

As a result, new cat reformers placed on stream next year will be devoted mainly to the production of higher octane motor fuel. If the market for toluene deteriorates, and alternate sources of benzene become competitive, some units now in aromatics operation may be switched to octane operation. This flexibility, in fact, has been an incentive for the building of many units during the past 2 years.

Octane potential up . . . Assuming no increased trend toward aromatics, it appears that the domestic refining industry will have at hand by the end of next year, approximately 500,000 b.p.s.d. in cat reforming capacity for the upgrading of straightrun naphthas. This, superimposed on a maximum of over 400,000 b.p.s.d. in thermal reforming capacity will go a long way toward realizing higher octanes from the virgin naphthas available for processing in United States refineries.

On the basis of present building plans, it appears that the capacity in cat reforming for motor fuel blending will reach about 6 per cent of total crude capacity by January 1, 1955. A recent market study resulted in an estimate that during 1953, light virgin naphtha blended to all gasoline, comprised about 870,000 bbl. per day. Heavy straightrun naphtha was estimated to amount to about 250,000 bbl. per day. Dr. Gustav Egloff of U.O.P., recently estimated that about 650,000 bbl. per day in straightrun naphthas were presently available as prime feed stocks for cat reforming. In addition, he estimated that the available supply of suitable reforming naphthas from natural gasoline sources is about 350,000 bbl. per day. Thermally cracked naphthas from coking, visbreaking and other thermal cracking operations represent another 300,000 to 400,000 bbl. per day, he added.

Naphthas occurring in natural gasoline and cycle product represent available reforming feed stocks which have been little used to date. Some of these naphtha fractions are being blended with feed stocks in refineries, but only one cat reformer has been built to process this type of stock exclusively. Atlas Processing Co., which processes no crude oil, charges a selected fraction of this type of naphtha to a Platformer for production of high octane blending stocks. In a separate operation, naturally occurring benzene is separated for nitration grade product. The growing production of these light liquid hydrocarbons represents a sizable pool for upgrading future gasoline octanes.

More coming . . . Hence it appears, that while cat reforming is off to a fast start, there will remain a sizable fraction of reformable naphthas available for further processing in facilities not yet contracted. The trend toward higher cat reforming capacity should continue strong for the next several years before the potential for upgrading the lowest octane fraction of gasoline is fully realized.

Continued attention on this type of process is indicated in the research programs of oil companies and process licensors. At least two new catalytic reforming processes will be publicly announced early next year, and many new units now planned will reach the contract stage during the first quarter of 1954.

In the extended future, reliable sources in the industry say further developments in catalysts will improve the economics of cat reforming, and extend the operation to admit a broader base of feed stock types. Further, contributory processes such as cat desulfurization and hydrogenation will clean up added volumes of naphtha for upgrading in cat reforming units. The projected increase in coking of heavy residual fractions will produce added amounts of thermal naphthas which, after the straightrun naphthas comprise the poorest gasoline blending stock.

Process combinations . . . In view of the expected continuation of octane increase, it is probable that the refiner, having taken care of converting his virgin component with cat reforming, will turn attention to the thermal gasoline. Some reforming catalysts today are designed to process a blend of thermal and straightrun charge stocks, and this type of processing is expected to show marked gains.

The cat reforming process, moreover, will contribute hydrogen for auxiliary units employed for desulfurization and for mild hydrogenation of some of the unsaturated hydrocarbons which reduce gasoline stability.

For example, Union Oil Co. of California recently announced plans for a 15,750-bbl. per day Unifiner which will be operated in conjunction with a 12,500-bbl. per day Platformer at the Oleum refinery, Wilmington. The Unifiner, using Union's cobalt molybdenum catalyst will process high-sulfur, high-nitrogen coker naphtha, consuming Platformer hydrogen for conversion of sulfur compounds to removable hydrogen sulfide. The essentially sulfur-free product will then be charged to the Platformer to produce 95-100-octane reformate.

Other catalytic dehydrogenation processes, such as Autofining and hydrodesulfurization will combine with cat

Summary of Catalytic Reforming in U. S.

(Rated Charge Capacities in Barrels per Stream Day)

Process—	In operation—		Contracted—		Total—	
	No. units	Capacity	No. units	Capacity	No. units	Capacity
Platforming	24	94,290	31	237,720	55	332,010
Fixed-bed hydroforming	6	69,300			6	69,300
Fluid hydroforming	1	2,000	3	57,500	4	59,500
Thermofor catalytic reforming			4	42,000	4	42,000
Catforming	5	6,250	6	33,100	11	39,350
Ultraforming			3	36,800	3	36,800
Houdriforming	1	10,000	2	9,000	3	19,000
Sinclair reforming			2	19,000	2	19,000
Cycloversion	6	13,500			6	13,500
Total	43	195,340	51	435,120	94	630,460

reforming to broaden the base of feed stocks available for octane improvement. Mild hydrogenation, as performed in the Hydrofining process can utilize the hydrogen production of cat reformers for the upgrading of all cracked distillates.

Hydrogen important . . . The net hydrogen produced in the cat reforming process looms as a very important dividend in this type of operation. While hydrogen production varies with the degree of conversion and the content of feed stocks, it is said to average about 500 cu. ft. per barrel of charge stock. On this basis, the refining industry will have producing daily, in fairly pure form, about 315,000 M.c.f. of this valuable element when all contracted facilities are on stream.

Most refiners operating or building reformers are investigating the possibilities of using this gas for other than blending to plant fuel. The Atlantic Refining Co. will utilize the hydrogen from its new catformer at Philadelphia for the synthesis of ammonia for the strong local market.

The consensus of tentative plans, however, favors the internal use of this hydrogen in upgrading petroleum products. Union Oil's plans represent one example. Another is the use of outside hydrogen in the Hydrofiner now building at Esso Standard Oil Co.'s Bayway refinery. Although the hydrogen source in this case is a ketone unit, cat reforming hydrogen can be used in the mild hydrogenation of unsaturates in cracked middle and light distillate stocks for upgrading diesel fuel cetane and for improving stability of burning oils and naphthas.

It is further probable that the coming availability of byproduct hydrogen will hasten the day when hydrogenolysis may become economic. This catalytic combination of hydrogen a residual fraction having a high carbon-hydrogen ratio, shows promise of converting still more of the low-valued bottoms fraction to hydrocarbons in the middle and light distillate ranges. The widespread adoption of cat reforming indicates a rising potential in hydrocarbon octanes within the next year. The trend promises to contribute further to other related processes designed to improve the product realization from each barrel of crude in the future.

CANADA

Imperial Line Due Increase

TORONTO, Ont.—Imperial Oil, Ltd., will add two pumping stations to the 188-mile products line linking its Sarnia refinery with London, Hamilton, and Toronto, boosting the capacity of the line by 40 per cent.

The $1,000,000 construction program will include stations at London and Waterdown designed to increase the throughput of the line from 39,000 to 55,000 bbl. daily. The project will be started next spring and is due for completion by the fall of 1954.

Licenses Bring $232,104

EDMONTON, Alta.—The Alberta government received a total of $232,104 at a recent sale of natural gas licenses. The largest price paid was by Calvan Consolidated Oil and Gas Co., Ltd., which gave the government $153,552 for the crown reserve natural gas license on 14,880 acres in the Consort area of central Alberta. In the same area, Pacific Petroleums, Ltd., paid $23,885 each for two parcels totalling 15,360 acres.

Hudson's Bay Oil and Gas Co., Ltd., purchased the license on 8,480 acres of land southwest of Peace River, in northern Alberta, for $30,782.

Consumers to Push Plans

TORONTO.—In spite of government opposition, Consumers Gas Co. intends to petition parliament immediately for a special charter to pave the way toward bringing U. S. natural gas into the eastern Canadian markets.

Under the recently approved dominion's pipe lines act, a special charter is necessary before the transmission company can apply to the Board of Transport Commissioners for authority to build a pipe line from the boundary at Niagara Falls to Toronto.

The government favors an all-Canada pipe line to bring gas from Alberta to serve the populous eastern Canada areas, and it is generally conceded Consumers' project would make such a line economically unfeasible. Consumers' plan to import 62,000,000 cu. ft. of U. S. gas has already received the approval of the Federal Power Commission. *(The Oil and Gas Journal, September 7, page 65, October 12, page 92 and November 30, page 44.)*

Northern Plant Sets Record

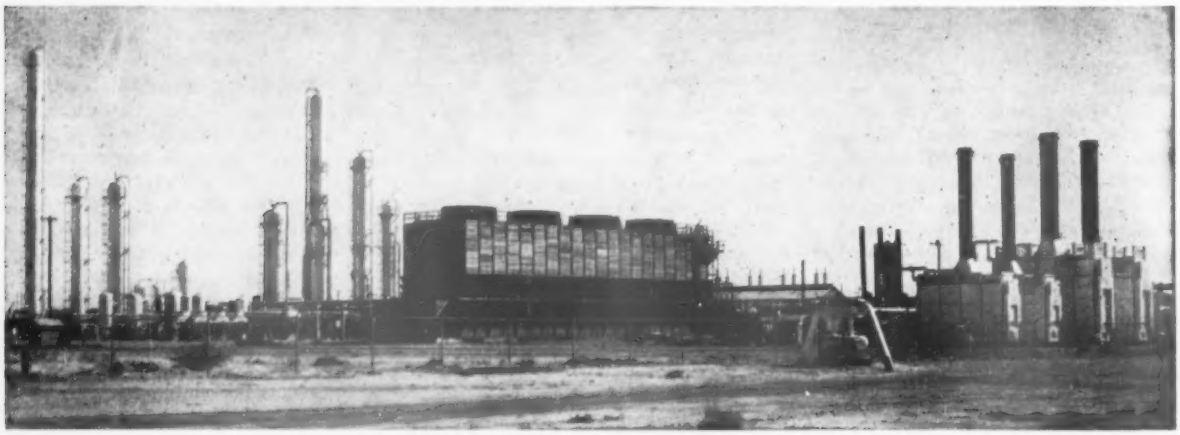
EDMONTON, Alta.—Canada's most northerly oil refinery at Norman Wells' Northwest Territories, reached a record volume production of 365,000 bbl. of processed crude this year.

Murray Mackenzie, superintendent, said operations have been suspended temporarily, as is the custom at this time of year. They will be resumed early in January.

When the plant is at peak volume, 90 persons comprise the staff. Products of the refinery are marketed throughout the Canadian north.

Texas Town Adds Derricks to Its Skyline

Another townsite-type oil development is taking place at Lawn, Tex., 25 miles south of Abilene. There are 42 wells producing in the townsite with spacing at two blocks per well including streets and alleys. Depth is from 3,975 to 4,050 ft., known as the Gardner sand. All leasing activities and drilling depth information are cleared through a local cafe owned by a member of the city council and the planning committee who also owns one of the town's producers.



MANY SPRABERRY WELLS which were permitted to continue production during the shutdown because all casing-head gas was being utilized were hooked to this Texas Gas Products Corp. natural-gasoline plant in Benedum field, thence to El Paso system.

Spraberry to Resume Production

Completion of facilities for conserving casing-head gas leads commission to end 9-month shutdown of huge field

Robert J. Enright

SPRABERRY Trend Area oil field, the so-called "slumbering giant" of the Southwest, will resume full-scale production the first of the year.

The huge West Texas field was given 17 producing days for January, the same as for the state generally, by the Texas Railroad Commission at its regular monthly crude-oil allowable hearing December 18.

The major portion of the 55 by 25-mile field, which takes in nearly half a million acres in Midland, Glasscock, Upton, and Reagan counties, has been shut in since April 1 by the Texas Railroad Commission for wasting casing-head gas. The commission estimated when the field was shut in that about 220,000,000 cu. ft. of gas daily was being wasted of a total production of about 280,000,000 cu. ft. Part of this volume was vented at the well head; part of its flared at gasoline plants with no pipe-line outlet for residue gas.

Motivation for the commission's unshackling of Spraberry was testimony by representatives of El Paso Natural Gas Co., Permian Basin Pipe Line Co., and the field's gasoline-plant operators that adequate facilities would be ready by the first of the year to handle all oil and gas production allowed under the proration schedule.

The only wells which have been permitted to produce since April have been those from which all gas was being utilized—and these only at a substantially reduced rate.

The area's only pipe-line outlet at the time of the shutdown was El Paso's 20-in. line from the Benedum region to the south. The company has been taking up to 103,000,000 cu. ft. of gas daily, a large portion of it Spraberry gas, through this line into its heavily loaded southern system, through New Mexico and Arizona to California.

The gas was residue from four gasoline plants—El Paso's Midkiff plant, the Tex Harvey Gasoline Plant, Inc., plant to the north, Texas Gas Products Corp.'s plant in the Benedum area (designated by the commission in July as a separate field with a full production allowable), and the Phillips Petroleum Co.-Plymouth Oil Co. plant in Benedum.

New outlet . . . New capacity for approximately 225,000,000 cu. ft. daily of Spraberry gas will become available, 150,000,000 cu. ft. by the first of January when Permian Basin Pipe Line Co. places its new 30, 26, 24, and 16-in. system in full operation.

This line bisects the field from south to north, bending northwest at the north end of the field to near Plains, Tex., in Yoakum County near the New Mexico line. A branch extends northeast from near Hobbs, N. M., also terminating at Plains. This line was substantially completed December 16 and started operations on a small scale shortly after.

Under a unique three-company exchange agreement, gas piped to Plains by Permian will be delivered there to El Paso for shipment to California markets via El Paso's new trunk line from Plains along the northern route by way of Gallup, N. M., and Kingman, Ariz. Capacity of this line is 300,000,000 cu. ft. daily. It also is scheduled for completion at the first of the year, according to El Paso officials. The swap agreement provides that Permian step up deliveries to El Paso to 300,000,000 cu. ft. daily by the second year of operation.

In return for the Permian gas, El Paso will turn over an equivalent volume at Dumas, in the Texas Panhandle to the north, to Permian's parent firm, Northern Natural Gas Co., for the latter's markets in the North and Midwest.

El Paso has been taking about 170,000,000 cu. ft. of residue gas daily from three gasoline plants in the Panhandle-Hugoton area. This will be turned over to Northern at Dumas. Volumes required over this amount will come from high-pressure gas production in the Hobbs, N. M., area, through the 26-in. Permian branch to Plains, thence north to Dumas through El Paso's existing 24-in. line. This will involve reversing the flow through the latter line.

Gasoline plants . . . There now are six gasoline plants in the Spraberry-Benedum area.

All of them now have adequate pipeline connections to handle substantially all of the residue gas from casing-head produced in the areas covered by their respective gathering systems.

Design processing capacity of these plants totals a staggering 730,000,000 cu. ft. daily. It is estimated, however, that the combined daily processing rate will be about 270,000,000 cu. ft. daily until next summer at least.

The six plants are:

. . . Tex Harvey Gasoline Plant, Inc., in the old Tex Harvey producing area in the northern end of the field, which was permitted to continue operations on a limited scale under the shutdown order. Processing capacity is about 35,000,000 cu. ft. daily.

. . . Phillips' Spraberry plant, also in the Tex Harvey area, shut down since April because of lack of a pipe-line outlet for residue gas. Design capacity of plant and line capacity is 150,000,000 cu. ft. Present compressor capacity, however, is only 80,000,000 cu. ft. Plant is now hooked into Permian system.

. . . El Paso's Midkiff plant in the Midkiff area of the field, now processing about 40,000,000 cu. ft. of gas daily. Design capacity is 225,000,000 cu. ft. daily. An expansion program now under way is scheduled for completion next summer.

. . . Phillips Pembrook plant, about 20 miles south of the Spraberry plant, completed the first of December. Construction work, started before the shutdown, was slowed with the issuance of the conservation order. Design capacity of the plant and of its field lines is about 125,000,000 cu. ft. daily. Present compressor capacity is 40,000,000 cu. ft. daily. Permian will take a total of 100,000,000 cu. ft. daily from Phillips' Pembrook and Spraberry installations.

. . . Phillips - Plymouth Benedum plant, which has a capacity of about 85,000,000 cu. ft. daily and receives gas from both the Spraberry and Fusselman horizons. About half the capacity is available for Spraberry gas. Operations were continued during the shutdown.

. . . Texas Gas Products Corp.'s Benedum plant, which also was not affected by the shutdown, has a processing capacity of about 112,000,000 cu. ft. of gas daily. It handles between 50,000,000 and 60,000,000 cu. ft. of Spraberry gas in addition to Benedum's Fusselman and Ellenburger pays. About 50,000,000 cu. ft. of the Spraberry gas is processed in remote absorbers in the Weiner Floyd area to the north, the remainder in the Benedum plant proper.

THESE are the pipe lines and natural-gasoline plants which the Railroad Commission was told can handle all casing-head-gas production resulting from as much as 20 days of production in Spraberry. The pipe lines are Permian Basin Pipe Line Co.'s newly completed 16 through 30-in. system bisecting the trend and El Paso's 20-in. line terminating in the Benedum area. Gasoline plants (represented by stars) from top to bottom are: Tex Harvey Gasoline Plant, Inc., and Phillips Spraberry, both in old Tex Harvey area; El Paso in Midkiff area; Phillips in Pembrook region; Phillips-Plymouth and Texas Gas Products Corp., both in Benedum field.

Drilling upshoot . . . A poll of industry opinion indicates that resumption of full-scale production in Spraberry will mean at least a moderate surge in drilling activity—practically nonexistent since the shutdown.

This is so for a number of reasons. First, payout prospects for Spraberry wells look much brighter because of two developments during the past year. These are the Railroad Commission's order early this year setting up 80-acre spacing in the field in place of the former 40 (operators may even go to 160-acre spacing on approval of application to the commission), and the 25-cent boost in the price of crude oil east of the Rockies last summer.

Secondly, it is expected that small operators will resume drilling. The small firms, with limited available capital and dependent on a quick return on investment, were understandably reluctant to risk money in drilling wells which, even if successful, would be shut in indefinitely.

Some observers feel that it will be the small companies and independents, rather than the large acreage holders such as Sohio, Stanolind, and Phillips, which will be doing most of the drilling in Spraberry. This will be accomplished in a large measure, they feel, through farmout arrangements with the large companies. Reasoning behind this is that Spraberry wells are not big and payout margins are slim. The smaller firms are able to do the job cheaper and are satisfied with smaller profits.

Best estimates place the number of wells in Spraberry now at 2,300, with completions since the shutdown running at a rate of about four a month. Though the field's outer limits are now conceded to be pretty well defined there is still a tremendous number of proved locations which have not been drilled. While any estimate of the number of these locations would have to be highly theoretical in view of questions on spacing, etc., it is thought by reliable sources that a totally drilled Spraberry would have three times the number of wells in the field at present.

Gas prospects . . . Casing-head-gas production from the present 2,300-odd wells is estimated all the way from about 280,000,000 to 400,000,000 cu. ft. daily. This amount unquestionably will be boosted substantially with additional drilling.

Prior to the shutdown, increasing numbers of Spraberry oil wells were becoming statuatory gas wells due to soaring gas-oil ratios. It is believed that this trend will continue. Gas production will not increase as a consequence of this, however, since the Railroad Commission, if it follows past policy, will not permit such a well to produce more gas than a neighboring crude producer—this to prevent wholesale dissipation of reservoir pressure.

Allowable Hiked

Spraberry crude to boost Texas output in January

AUSTIN.—The Texas Railroad Commission raised the Texas crude-oil production allowable for January to 2,824,423 bbl. daily at its regular monthly meeting here December 18, an increase of 36,571 bbl. daily over that set December 5.

The increase was due primarily to a decision to restore to production essentially all Spraberry Trend Area field wells which were shut in last April 1 by the commission to save casing-head gas.

The resumption of full-scale production in Spraberry was reflected in the increased allowables in January for Districts 7-C and 8, which jumped 17,594 bbl. and 15,409 bbl., respectively. These gains together represent roughly 33,000 bbl. of the total 36,751 bbl. gain in total allowable production.

Spraberry producers were given 17 producing days for January, compared with 11 in December. The commission continued the producing days for the remainder of the state, including East Texas field, at 17 days.

The commission's action regarding Spraberry was taken on the testimony of representatives of Permian Basin Pipe Line Co., El Paso Natural Gas Co., and natural-gasoline plant operators in the field that adequate facilities would be ready by the first of the year to handle all casing-head gas resulting from up to 20 days' oil production.

ALLOWABLES BY DISTRICTS
(Barrels per calendar day)

	Dec. 5	Jan.	Increase
Dist. 1	44,435	44,822	387
Dist. 2	140,501	140,176	—325
Dist. 3	444,482	445,563	1,081
Dist. 4	250,831	251,023	192
Dist. 5	46,987	47,165	178
Dist. 6 (Outside East Texas)	119,126	117,794	—1,332
Dist. 6 (East Texas field)	233,949	233,940	—9
Dist. 7-B	147,749	149,580	1,831
Dist. 7-C	174,267	191,861	17,594
Dist. 8	856,660	872,069	15,409
Dist. 9	228,244	228,956	712
Dist. 10	100,621	101,474	853
Total	2,787,852	2,824,423	36,571

Unit-Injection Proposed

AUSTIN. — Fullerton Oil Co. has asked Railroad Commission approval of a unitization agreement and revised field rules for Fullerton field, Andrews County, to permit a gas and water injection program expected to increase ultimate recovery by 32,000,000 bbl.

Fullerton representatives told the commission 95 per cent of the working interest and more than 75 per cent of the royalty holders have approved the agreement. Continental Oil Co. and Humble Oil & Refining Co. have refused to sign the unit agreement because both object to the participation formula.

The field has two producing Permian-Clearfork areas. The north dome produces from the first and second zones in the upper reservoir and from the third and fourth zones in the lower reservoir. Production in the south dome is from the upper reservoir only.

Plans call for gas injection of 17.6 million cubic feet per day into 12 wells in the lower reservoir of the north dome and into four wells on the south dome. Water injection would be carried on in a pilot operation of two double five-spot patterns with an initial injection of 621 bbl. daily per well. The water injection is expected to increase production by 2.3 million barrels.

Imbibition Extension Asked

AUSTIN. — Atlantic Refining Co. has asked the Texas Railroad Commission for a 1-year extension on its experimental water-imbibition project in Spraberry Trend Area field.

Atlantic said there had been a noticeable increase in oil production in the test area, but it needed more time in order to determine whether the gain has been due to the fact the field has been shut in or whether it is due to its water-injection program, or both.

J. W. Stayton and Jesse Johnson told Examiner Charles Slack that about 550,000 bbl. of water has been injected to date. The volume of fractures in Spraberry has been estimated at 100 bbl. per acre, they said, and since there are about 6,000 acres in the test area the fractures are believed to be almost filled. Water breakthrough has been noted in about six wells on a northeast-southwest trend.

The imbibition process, developed by Atlantic, is based on the idea that the tight Spraberry producing sand will absorb injected water, releasing crude as it absorbs the water. *For a detailed article on the process, see The Oil and Gas Journal, November 17, 1952, page 264).*

INDUSTRY AFFAIRS

New Refinery Planned

Great Northern Oil Co. will build 25,000-bbl. refinery in Minnesota to process crude from Saskatchewan fields

HOUSTON.—A new refinery which will process medium-gravity Saskatchewan crude will be built next spring by Great Northern Oil Co. on the Mississippi River in the Twin Cities area of Minnesota.

J. R. Parten, chairman of the board of Great Northern and head of Woodley Petroleum Co., here, a principal stockholder in Great Northern, said a 10-year supply of Saskatchewan crude has been committed by Socony-Vacuum Exploration Co., Woodley Canadian Oil Co., and Southern Production Co., Inc.

Parten also disclosed that William J. Carthaus, vice president of Deep Rock Oil Corp., Tulsa, has been elected president of Great Northern and will resign his Deep Rock post February 1. Great Northern headquarters will be in St. Paul.

Other Great Northern officers include Marlin E. Sandlin, vice chairman and secretary; J. E. Vaeth and J. Howard Marshall, vice presidents; H. T. Ellwood, treasurer; and J. B. Cook, assistant treasurer.

Directors will include C. T. Chenery, board chairman of Southern Production, and Sylvester Dayson.

Design capacity of the refinery will be 20,000 to 25,000 bbl. per day. Most Saskatchewan crude has a gravity of about 24°, but provision will be made to handle higher-gravity crude from the Williston basin if it should become available.

Pipe-line plans . . . Socony-Vacuum has not yet announced its plans for a pipe line to take Saskatchewan crude to the Twin Cities, but the company has been studying alternate projects for several months. *(The Oil and Gas Journal, December 21, page 112, and September 21, page 152.)*

Earlier in the year Socony announced a plan for a crude line from the Fosterton area of southwestern Saskatchewan to Regina where it could serve existing refineries and also connect with the Interprovincial pipe line running to Sarnia, Ont., via Superior, Wis., and across Michigan. The company then considered moving this

crude part way through Interprovincial and taking it off either in northern Minnesota or at Superior with a pipe line to Minneapolis-St. Paul.

However, Socony is a member of a group of Williston basin operators now planning a crude line to serve that entire region. The group has commissioned Shell Pipe Line Corp. to develop plans for such a system, tentatively christened Sioux Pipe Line System.

One proposal being considered is for a big-inch line originating in Southeast Saskatchewan, traversing the central part of the Williston basin to serve producing areas in eastern Montana and western North Dakota, and running east to Minneapolis and on to the Chicago refining area.

Refinery plans . . . Great Northern hopes to be able to break ground early next summer, and construction of a refinery of this size normally would require 12 to 18 months. This indicates that the new plant will be on stream about the fall of 1955, at which time Socony-Vacuum must have its pipe line completed.

The Twin Cities area will become an important refining center with the completion of these projects. Northwestern Refining Co. has a plant at St. Paul Park, currently running on crude brought in by tank car, and is now engaged in an expansion program which will give it a total capacity of around 40,000 bbl. per day by the time the pipe line is in operation.

The Twin Cities area already is an important distribution center for petroleum products. It is at the head of navigation on the Mississippi River, and is served by products pipe lines of Standard Oil Co. (Ind.), and Great Lakes Pipe Line Co.

Year-End Report

Porter cites '53 as year of expansion, record-breaking

NEW YORK.—The year just ending was another of great expansion and new records, Frank Porter, American Petroleum Institute president, said last week in a year-end summary report.

Porter pointed out that domestic demand, capital expenses, well completions, refining capacity, and refinery runs all set new records during 1953. The world's producing-depth record was broken, and the world's deepest hole was drilled during 1953.

Capital expenditures possibly exceeding 4 billion dollars during 1953 bring the postwar total to "well over 20 billion dollars," Porter said. "This is striking evidence of the industry's efforts to develop its facilities, improve its services, and keep the American people and the Armed Forces supplied with an abundance of petroleum products," Porter declared.

Porter estimated well completions this year at nearly 50,000, refinery capacity by December 31 of 8,000,000 bbl. daily, and average refinery runs during the year of more than 7,000,000 bbl. daily.

Next year, he said, refinery capacity will increase further, reaching an estimated 8,360,000 bbl. daily by next September 30.

Porter pointed out that for the first time in history, the United States failed to produce more than half of the world's total output. During 1953 foreign production so increased that the U. S. output figured 49.7 per cent of the world total.

NUMEROUS CONSTRUCTION PROBLEMS were encountered by contractors in this general area, the "Little Holland" between Bay City and Port Huron on Michigan's lower peninsula, due to the high water table and the many deep drainage canals.

Lakehead in Business

Alberta crude to reach Sarnia refineries this week via Interprovincial-Lakehead, world's longest oil trunk line

Robert J. Enright

SUPERIOR, Wis.—First oil is expected to reach Sarnia, Ont., this week through Lakehead Pipe Line Co.'s new 645-mile, 30-in. crude line from Superior.

Construction of the line, the largest-diameter crude artery in the United States, was completed November 2. Testing difficulties delayed first deliveries, which initially were scheduled for about the first of December.

Initial shipments will average 100,000 bbl. daily, about 20,000 bbl. under the system's present daily capacity, T. S. Johnston, president of Lakehead and of Interprovincial Pipe Line Co., Lakehead's Canadian parent, said last week.

Deliveries will be made alternately to refineries of Imperial Oil, Ltd., and Canadian Oil Companies, Ltd., at Sarnia. Combined crude-charge capacity of the two refineries is roughly the same as initial throughput. No arrangements have been made, Johnston said, to supply crude to the 15,000-bbl. Sarnia refinery of Sun Oil Co., Ltd., which was placed on stream in November. The first batch in the line is made up of Leduc crude and amounts to about 279,000 bbl.

Bottleneck eliminated . . . Completion of the $74,000,000 Lakehead project, actually an extension of the 1,120-mile, Edmonton, Alta., to Superior line of Interprovincial, assures year-round delivery of crude to the Sarnia plants, eliminating the 5-month winter interruption in the flow of oil by tanker due to freezing over of the Great Lakes. The project was regarded as a vital defense measure both in the United States and Canada.

Construction work was completed in

5 months for one of the fastest major construction jobs in pipe-line history. The combined Interprovincial and Lakehead system stretches 1,765 miles, making it the longest continuous crude-oil main line in the world.

Expansion . . . Lakehead capacity ultimately will be increased to 300,000 bbl. daily through the construction of five additional pump stations. Volume increases, according to Johnston, will result from a progressive expansion program over the years.

One of the projected pump stations will be built next year, raising capacity of the line to 138,000 bbl. daily *(The Oil and Gas Journal, December 21, page 113)*, in conjunction with the 1954 construction program just announced by Interprovincial.

This involves looping 600 miles of the Interprovincial system between Edmonton, Alta., and Superior with 24 and 26-in. pipe and adding eight new pump stations in addition to the Lakehead station already mentioned. These will be located between Regina, Sask., and Superior with five in Canada, four in the United States.

The program will boost capacity out of Edmonton to 200,000 bbl. daily, compared to an average throughput this year of 155,000 bbl. daily.

Transportation costs . . . Pipe-line tariff from Edmonton to Sarnia is 64 cents per barrel. Since posted crude prices in the Alberta fields have not changed, it is believed that transportation costs to the refinery have changed little, if any, with completion of the Lakehead extension. A strong deterrent to a higher delivered price for Alberta crude at Sarnia is the possibility that Sarnia refiners might turn to United States crude from the Mid-Continent region if Alberta crude prices get out of line.

The big savings to the refiners, in addition to the direct benefit accruing from steady year-long delivery of crude, is the elimination of the need for maintaining large and costly facilities for storing crude at the refineries during the summer and at the western end of the lakes during the winter.

Route . . . The Lakehead line runs generally east from Superior across the upper peninsula of Michigan to the Straits of Mackinac, southeast across the lower peninsula of Michigan through Bay City, Saginaw, and Port Huron, and across the St. Clair River to Sarnia.

The most spectacular part of the project was the successful crossing of the Mackinac Straits between Lake Huron and Lake Michigan. This was the deepest and one of the most costly underwater pipe-line crossings ever attempted. It involved laying two 21,000-ft., 20-in. lines under the straits at depths as far as 230 ft. below the surface *(The Oil and Gas Journal, August 3, page 34, and September 21, page 168)*. Cost of the crossing was estimated as high as $8,000,000—more than 10 per cent of Lakehead's total outlay for the entire project.

Engineering and management of the project was handled by Bechtel Corp., as agent for Lakehead.

Main-line contractors were Mahoney Contracting Co., Anderson Brothers Corp., Midwestern Constructors, Inc., Bechtel Corp., and Conyes Construction Co. Contractor for the straits crossing was Merritt, Chapman & Scott Corp.

Plant Bids Studied

Five firms offer $61,427,207 for Government's Louisiana, Mo., plants; American Cyanamid's $3,325,000 bid is tops

OMAHA.—The U.S. Army Corps of Engineers received six bids proposing purchase or lease of facilities at the war-surplus Quartermaster Experimental Fuels Station near Louisiana, Mo.

Brig. Gen. W. E. Potter, Missouri River Division Engineer for the Corps of Engineers, said no single bid covered the entire project. A top bid of $3,325,000 was submitted for the ammonia plant, one of the major production facilities at the government-owned plant. Other major units up for sale were the experimental coal-hydrogenation and gas-synthetics plants built after World War II by the Bureau of Mines.

The top $3,325,000 bid for the ammonia plant was one of the two proposed by American Cyanamid Co., New York. The first suggested that the company lease on a rental basis for 6 years the ammonia plant and all land except that occupied by the fuels plant.

The company would operate the plant and pay the Government $12.60 a ton for ammonia produced, with a minimum yearly guarantee of $327,000, or a total minimum guarantee of $1,965,000 for the 6-year period. The proposal included an option to extend the lease for an additional 12 years. It contained no offer to purchase the fuels plants but suggested that the company maintain them on a standby basis at a cost to the Government of $92,972 annually.

The second offer was simlar to the first but included an option provision under which the company could purchase the ammonia plant and all lands within 3 years for $3,325,000. A slightly higher production-unit price, $13.23 per ton of ammonia produced, was proposed in this bid together with the 12-year lease-renewal option. The $13.23 per ton quotation would net the Government a guaranteed minimum of $2,063,000 for the 6-year period.

Other bidders . . . Other bids on plant facilities were made by:

. . . National Distillers Products Corp., New York, $2,500,000 for ammonia plant facilities and all lands excluding the synthetic-fuels plants.

. . . Brown - Strauss Corp., Kansas City, Mo., $201,600 for the coal-hydrogenation and gas-synthesis plants.

. . . Perry Equipment Corp., Philadelphia, $250,607 for synthetic - fuels plants.

. . . T. Y. Fong, Tokyo, Japan, bidding for South American Investment Co., Sao Paulo, Brazil, $150,000, for all facilities except the synthetic-fuels plants.

General Potter indicated it would be about 60 days before final action is taken on the bids. He pointed out that sale or lease of the ammonia facilities is conditioned upon an option held by Hercules Powder Co., original operator of the plant. This provides that Hercules must be given an opportunity to meet the best offer submitted by the bidders.

All proposals must be submitted to the Chief of Engineers in Washington and through him to the secretary of the Army for final authorization.

Economy angle . . . The synthetic-fuels plants at Louisiana, Mo., were closed by an order issued by Secretary of the Interior Douglas McKay April 13 after more than 5 years of operation at a cost to the Government of about $75,000,000. McKay said the demonstration was being abandoned as unprofitable and that the Louisiana plant had produced its maximum in the way of studies and tests. In the future, he said, such studies would be limited to the laboratories of the Bureau of Mines.

The closing of the Louisiana installation was the Eisenhower administration's second action under its announced policy to get the Government out of the oil business in the interest of economy. The first, announced a few weeks earlier, was the termination of the Navy's oil-exploration program in Naval Petroleum Reserve No. 4 in Alaska.

Industry Briefs

BISMARCK, N. D.—North Dakota's Industrial Commission last week set the state's first oil allowable at 14,702 bbl. daily in January after the first formal market demand proration hearing. The limit was recommended by the state geologist's office on the basis of crude purchasers' nominations.

LONG BEACH.—Monterey Oil Co. has resumed construction on its 75-ft. diameter drilling island 1½ miles offshore from Seal Beach, and if all goes well it will be completed about next March 1. Drilling of the first of three wells to further test the 1,400-acre lease, held jointly with The Texas Co., will be started before April 1.

ECONOMICS

Secondary Stocks Up

Storage capacity 63 per cent full on October 31

WASHINGTON.—Secondary inventories of major refined products increased nearly 2,300,000 bbl. during October, in contrast with a decline of 403,000 bbl. in the same month last year.

The Census Bureau reported last week that secondary stocks of gasoline, kerosine and heating oils in the hands of jobbers and refiner-marketers increased from 54,889,000 bbl. September 30 to 57,163,000 bbl. October 31 but were still 307,000 bbl. under the 57,460,000 bbl. reported on the latter date a year ago.

The bureau noted that gasoline stocks declined, for the third successive month, from 18,986,000 to 18,661,000 bbl., but inventories of other products increased. Holdings of kerosine rose from 7,553,000 to 7,891,000 bbl.; distillate fuels from 21,376,000 to 22,681,000 bbl., and residual fuels from 6,974,000 to 7,930,000 bbl.

A new survey of storage capacity placed the total of Districts 1, 2, 3, and 4 on October 21 at 85,200,000 bbl. compared with 84,400,000 bbl. on July 31. The October 31 capacity included 30,800,000 bbl. for gasoline, 12,900,000 bbl. for kerosine, 30,700,000 bbl. for distillates and 10,800,000 bbl. for residual fuel. By districts, 38,300,000 bbl. was located in District 1, 36,200,000 bbl. in District 2, 8,000,000 bbl. in District 3 and 2,700,000 bbl. in District 4.

Secondary inventories filled 63 per cent of the storage capacity on October 31, compared with 54 per cent on July 31, and 64 per cent on October 31, 1952.

Inventories held in the several districts October 31, compared with September 30, 1953, and October 31, 1952, are shown in the accompanying table in thousands of barrels.

	Oct. 1953	Sept. 1953	Oct. 1952
Gasoline:			
PAD 1	5,039	5,145	6,253
PAD 2	8,068	8,143	8,214
PAD 3	2,428	2,602	2,567
PAD 4	915	926	838
PAD 5	2,211	2,170	2,049
Total	18,661	18,986	19,921
Kerosine:			
PAD 1	3,536	3,451	3,485
PAD 2	3,569	3,258	3,780
PAD 3	596	654	669
PAD 4	87	90	99
PAD 5	103	100	112
Total	7,891	7,553	8,145
Distillate:			
PAD 1	13,055	12,595	12,458
PAD 2	6,953	6,240	6,917
PAD 3	946	843	1,196
PAD 4	513	489	511
PAD 5	1,214	1,209	1,342
Total	22,681	21,376	22,424
Residual:			
PAD 1	5,408	4,789	4,521
PAD 2	1,722	1,571	1,820
PAD 3	611	415	449
PAD 4	10	8	10
PAD 5	179	191	180
Total	7,930	6,974	6,980
Four products:			
PAD 1	27,038	25,980	26,717
PAD 2	20,312	19,212	20,731
PAD 3	4,581	4,514	4,881
PAD 4	1,525	1,513	1,458
PAD 5	3,707	3,670	3,683
Total	57,163	54,889	57,470

Crude Imports Drop

Dip of 110,000 bbl. daily from September record

CRUDE imports dropped 110,000 bbl. daily in October from the all-time record set in September, according to data released by the Census Bureau of the Department of Commerce.

Total imports of crude and products for the month averaged 966,000 bbl. daily compared with 1,049,000 bbl. daily in September and 1,048,000 bbl. daily in October last year.

Part of the decrease of 110,000 bbl. daily for crude was offset by the seasonal increase in imports of residual fuel. Heavy fuel averaged 331,800 bbl. daily for a gain of 37,000 bbl. over September. However, compared with October 1952, heavy fuel was off 41,600 bbl. daily.

Imports of other products, mostly distillate, asphalt, and unfinished oils, averaged 14,700 bbl. daily compared with 25,100 bbl. daily in September and 24,900 bbl. daily for October of last year.

Largest decreases in daily average receipts of crude were reported for: Venezuela, 65,500 bbl.; Kuwait, 37,400 bbl.; Saudi Arabia, 24,900 bbl.; and the Far East, 15,300 bbl. A new record was established by imports from Qatar with an average for the month of 22,600 bbl. daily, but the large total was probably due to unequal monthly distribution of shipments since no crude from Qatar was reported for September.

Exports of crude and products averaged 324,000 bbl. daily for October, up 8,000 bbl. daily from September but down 9,000 bbl. daily from last year. Gasoline exports decreased 23,400 bbl. daily from September, and kerosine shipments were down 4,100 bbl. daily.

The important gains for the month were in exports of distillate and residual fuels, up 11,200 bbl. daily and 14,900 bbl. daily respectively.

Exports of lube oils averaged 38,600 bbl. daily for the highest level so far this year.

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

	Oct. 1953	Sept. 1953	Oct.† 1952
Crude—			
Mexico	379	173	579
Colombia	1,337	1,159	1,601
Venezuela	9,807	11,458	10,413
Kuwait	3,050	4,073	2,936
Saudi Arabia	2,363	3,034	3,041
Iraq	92	197	540
Canada	342	327	120
Far East	1,030	1,455	905
Qatar	700		
Ecuador	90		
Total crude	19,190	21,876	20,135
Daily average	619	729	650
Products—			
Residual fuel	10,286	8,845	11,575
Other products	457	754	773
Total products	10,743	9,599	12,348
Daily average	347	320	398
Total all oils	29,933	31,475	32,483
Daily average	966	1,049	1,048

EXPORTS*

	Oct. 1953	Sept. 1953	Oct.† 1952
Crude	1,178	1,109	1,526
Gasoline	2,000	2,638	2,385
Kerosine	324	439	357
Distillate	2,375	1,961	2,751
Residual	2,176	1,658	1,372
Lube Oils	1,197	934	1,055
Other products	779	742	884
Total products	10,029	9,481	10,330
Daily average	324	316	333

*Excludes shipments to territories. †Revised.

Antitrust Trial Due

Eleven charges face seven firms, conservation body

WASHINGTON. — The Department of Justice is preparing to bring its West Coast antitrust suit to early trial.

In a letter to the National Oil Marketers Association, Asst. Atty. Gen. Stanley N. Barnes wrote the case is now being prepared by one of the department's best trial attorneys who is engaged solely with the matter.

The West Coast suit was filed by the department May 12, 1950, under former Atty. Gen. J. Howard McGrath. It named as defendants Standard Oil Co. of California, The Texas Co., Shell Oil Co., Tide Water Associated Oil Co., Richfield Oil Corp., General Petroleum Corp., Union Oil Co., and the Conservation Committee of California Oil Producers.

The complaint contained seven charges relating to production and distribution and four charges relating to practices alleged to have been adopted by the companies to eliminate competition among themselves, with the alleged result that the seven companies had acquired a virtual monopoly in all phases of the West Coast oil industry.

The Government seeks dissolution of the conservation committee, the opening of company-owned gathering and trunk pipe lines to independent producers and refiners, divorce of production and refining from marketing, abolition of exclusive dealing contracts, and an end to acquisition by the defendants of the capital stocks or assets of producers or refiners except upon a showing that such purchase will not substantially lessen competition.

Phillips Asks Rehearing

WASHINGTON.—Phillips Petroleum Co. has asked the Supreme Court to reconsider its refusal to review the question of natural-gas producers and Federal Power Commission authority, but observers here point out that once the high court rejects a case it rarely agrees to take a second look at it.

Phillips will be joined in its appeal by the states of Texas, Oklahoma, and New Mexico and various industry associations, including the Independent Natural Gas Association of America.

Opposition to a rehearing is expected to be voiced by the city and state bodies which started action leading to the court decision after the FPC had once ruled it had no authority over the prices at which Phillips sold gas to interstate pipe-line companies.

The case is of far-reaching importance, affecting every natural-gasoline or cycling plant delivering gas to an interstate transmission system *(The Oil and Gas Journal, December 7, 1953, page 68).*

Proration Scored

Marketers want Connally "hot oil" act repealed

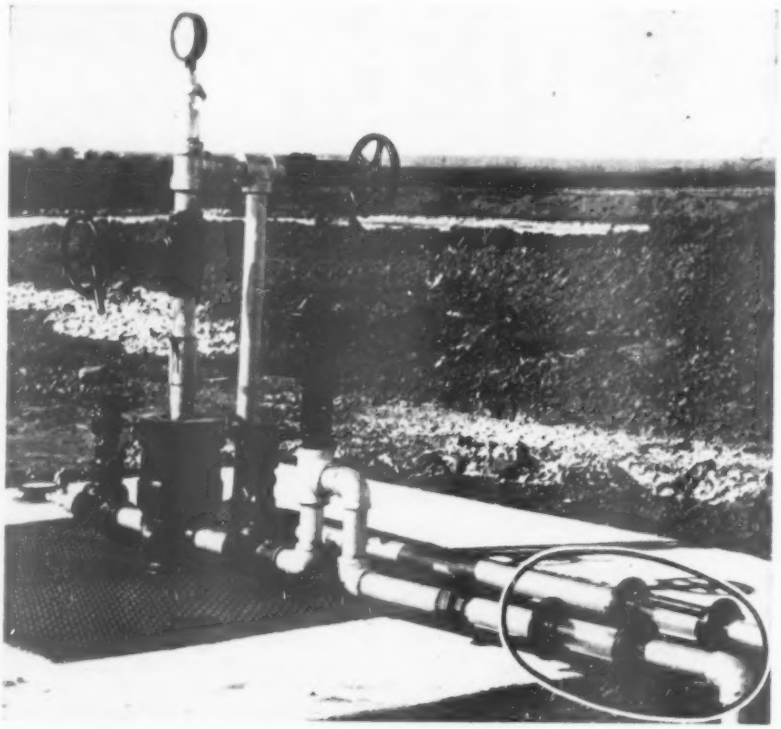
WASHINGTON.—A legislative ban on interstate commerce movement of oil produced in any state which uses "market demand" as a factor in proration was urged last week by the National Oil Marketers Association.

The prohibition was one of a series of steps to "stamp out" monopoly in the petroleum industry recommended in a brief prepared by Paul E. Hadlick, general counsel of the association. The brief was filed with the Malone subcommittee investigating the wartime availability of fuels and strategic minerals and metals.

The association's presentation did not discuss the question of wartime oil supply in detail, but attacked state conservation laws and alleged company control of imports as limitations on the ability of the domestic industry.

In addition to outlawing of present proration laws and substitution of "true conservation" measures, the association urged repeal of the Connally "Hot Oil" Act, discontinuance of the Bureau of Mines' monthly forecasts of demand and repeal of the congressional approval of the Interstate Oil Compact. Hadlick charged all with supporting domestic production limitations designed to maintain crude-oil prices.

Studies urged . . . Hadlick also called for a Senate Interior subcommittee study of the "international oil cartel" now the subject of government suit in New York, alleged tax avoidance through wholly owned foreign subsidiaries of American companies, the role of oil-company officials in government positions, the depletion allowance, accelerated amortization grants, operation of pipe lines as plant facilities rather than common carriers, and the extent



Both Zones Flowing? It's Easy to Tell Here

Plastic "windows" in these flow lines make it a simple thing to determine whether both zones being produced by this dually completed well in Texas are flowing crude. The well is American Trading & Production Corp.'s 2 Jesse Little in White Flats field near Trent, Tex.

of major oil company control over ocean-going tankers in both the coastwise and international trade.

Hadlick agreed with the domestic producers that it is necessary to prevent unfair competition from low-cost imports of foreign crude, but attacked proposals for imposition of a quota as only adding "another prop under proration."

"Congress should allow the 1934 Trade Agreements Act to expire in June of 1954 and allow the Congress, through the Tariff Commission, to set fair and reasonable terms under which such imports would compete with American products," he said.

Decision Is "Threat"

Arn says Phillips ruling imperils entire industry

WASHINGTON.—The Supreme Court decision in the Phillips Petroleum Co. case "threatens the entire petroleum industry" and should be corrected by legislation stripping the Federal Power Commission of authority to regulate natural-gas producers, a Senate subcommittee was told last week by Gov. Edward Arn of Kansas.

Arn, chairman of the Interstate Oil Compact Commission, declared the "uncertainty" arising from the decision that the FPC has jurisdicion over sales of gas to interstate transmission lines at natural-gasoline plants operated by Phillips will discourage investors from entering into oil and gas exploration and drilling activities.

"I feel that such regulation of producing activities is undesirable not only for the petroleum industry but for the entire consuming public," Arn told the Senate Interior subcommittee which is investigating wartime availability of oil.

Arn told the subcommittee the health of the oil industry demands the present depletion allowance be maintained to encourage risk capital investment.

Arn told the subcommittee imports should be reduced to a level which would supplement but not supplant domestic production, and said this could be accomplished better by "the exercise of proper statesmanship" by industry leaders than by government quotas or other regulation.

"Today," Arn declared, "the maintenance of an adequate price for both crude oil and natural gas is a prime economic incentive for continued exploration.

"The domestic petroleum industry is capable of maintaining and increasing its current rate of activity, given adequate economic incentive and freedom from unnecessary controls."

WATCHING WASHINGTON

Bertram F. Linz

Plants Get Defense Study

Civil defense experts are studying the nation's productive facilities to determine what plants in what industries should be given greatest protection against catastrophe and most immediate rehabilitation in the event of bombing or other emergency.

The type of product, volume of production, location and other factors will enter into the classification of plants as vital. All refineries probably would be classified as essential, but aviation gasoline facilities and certain other types of installations might be tagged as vital.

The government is seeking to induce operators of all plants to set up civil defense programs for the assignment of alternative personnel to act in executive capacities in the event of casualties.

Production Index Revised

The Federal Reserve Board has modernized its index of industrial production, basing it on the average activity in 1947-49 instead of 1935-39.

The new index covers oil and natural gas production, well drilling, and six major oil products. Here are the latest statistics, using 1947-49 as the base (100):

Crude oil production for 1952 as a whole stood at 120, hit a 1953 high of 127 in July and dropped back to 126 in August and September.

Natural gas production was at 159 for 1952, hit a high this year of 187 in February and a low of 152 in May and June and had again risen to 156 in August.

Natural gas liquids production stood at 145 for 1952, and after dropping from 158 in January to 151 in May had climbed to 160 in September.

Oil and gas well drilling stood at 144 for 1952, dropped from 147 in January to 140 for the two following months, after which it climbed, with slight set-backs in May and August, to 167 in September, with indications that rate continued through October.

Automotive gasoline at 128 for 1952, touched a 1953 low of 132 in April and a high of 144 in July and August, dropping to 141 in September. Aviation gasoline at 194 for 1952, started 1953 at 204 and was up to 247 in September.

Distillate fuel oil production averaged 151 for 1952, hit a 1953 high of 162 in January and a low of 148 in May, recovering to 153 in September. Residual stood at 102 for last year, hit a 1953 high of 106 in January then dropped steadily to 98 in May, recovering slightly for the following 3 months but back to 98 in September.

Kerosine production stood at 119 for 1952, with a 1953 high of 142 in January and a low of 105 in July and August, recovering to 108 in September.

Lubricating oil production stood at 112 for 1952, hit a 1953 low of 95 in February, recovering to 112 for September.

Antitrust Laws Supported

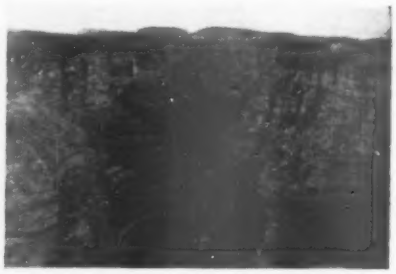
Executives of a number of retailer organizations, including the National Congress of Petroleum Retailers, are fighting vigorously any relaxation of the Robinson-Patman Act in a revision of the antitrust laws now under study by a Justice Department committee.

In a brief filed with Attorney General Herbert Brownell, Jr., for consideration by the committee, the associations declared the act strengthens rather than softens competition "by depriving the small fringe of unscrupulous firms of the advantages of 'special deals,' 'secret rebates' and other unjustified allowances."

"The whole purpose of the act is to protect competition so that price discriminations will not create a small permanent class of buyers who by abusing their power contrive to gain an unnatural and overpowering advantage over their less favored competitors," they told the attorney general.

"The Robinson-Patman Act furthers and fosters genuine competition in trade and business, not by restraining competition, not by protecting 'competitors instead of competition,' but by restraining the exercise of the right to compete, by prohibiting persons from persistently, continuously and systematically engaging in coercive and subversive buying practices which lessen competition, tend to monopoly, and ultimately destroy competition altogether."

DEAD SEA SHORELINE, near which the Lapidoth wildcat is located. The test is 3 miles to the southwest. On the shore in the foreground stood the Biblical city of Sodom.



TYPICAL stratigraphic section exposed in the area adjacent to the Lapidoth test-well location.

MIDDLE EAST

Israeli Test Drilling

First deep wildcat ever drilled in country now below 700 ft., will test anticline near southwest end of Dead Sea

THE first deep test for oil in Israel —and the second wildcat ever spudded in the country—last week was drilling ahead below 700 ft.

The well is the 1 West Mezel, a joint venture of Lapidoth Israel Oil Prospecting Co., Jordan Exploration Co., Ltd., and Israel Oil Prospectors, Ltd. These Israeli companies, partly backed by foreign capital, hold concessions over about 175,000 acres in the area.

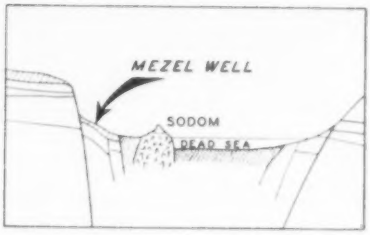
W. T. FORAN
Chief geologist

Site of wildcat is near the village of El Ghor, about 52 miles southeast of Jerusalem in the Dead Sea graben. The location is near one of the most pronounced oil seepages in the Near East, in an area featured by highly dissected topography resembling the canyons of the San Juan River of Utah.

Surface structure was mapped in Cretaceous rocks by William T. Foran, Lapidoth chief geologist, who believes the West Mezel structure is one of the most promising in Israel.

Foran, now stationed at Tel Aviv, was with Standard Oil Co. (N.J.) for 12 years in Argentina and Bolivia, spent 4½ years in the Near East with Iraq Petroleum Co., and was with the U. S. Naval Coal Commission and the U. S. Geological Survey in Alaska for 2 years. With Ben T. Gellenbeck, Foran assembled the million-acre lease block now being prospected jointly by Phillips Petroleum Co. and Kerr-McGee Oil Industries, Inc.

Kerr-McGee is contractor for Lapidoth's Israeli venture, and on the Mezel well is using a cable-tool rig. The well will test an anticline lying in a downthrown fault block. Kerr-McGee will manage development in the event production is found. General superintendent for Kerr-McGee is Paul Roch, formerly Kermac district superintendent at Corpus Christi.



The only other well ever drilled for oil in Israel was located in the southern coastal plain near Juleiqat. Drilling was stopped at a total depth of 3,464 ft., probably in the Cretaceous, leaving an estimated 7,000 to 16,000 ft. of sediments undrilled. Total thickness of sediments in the West Mezel area has been estimated at between 7,500 to 12,000 ft.

Another exploratory test drilled 8 miles outside the Israel border at El Khabra in Sinai was taken to 10,282 ft. and stopped in the Jurassic without encountering oil.

Ten core holes have been drilled for geologic information on the flanks of salt domes in the Dead Sea area, and two of these tests drilled through thick impregnations of asphalt.

Four foreign companies are participating in the Israel exploration. Husky Oil Co. has reported its preliminary studies encouraging and is making preparations to drill. New Continental Oil Co. of Canada, has arranged with Pontiac Drilling Co., Wichita Falls, Tex., to handle its drilling. Representatives of Israel Oil Licenses, Inc., and Pan-Israel Oil Co., Inc., both headed by William F. Buckley, New York, also are now doing field work in Israel.

Egyptian Line Bids Asked

Bids for materials and construction of a 90-mile fuel-oil pipe line from Suez to Cairo have been invited by the Egyptian Government's Permanent Council for the Development of National Production.

Tenders must be submitted to the

council by March 31 with a preliminary deposit of E£500 ($1,440) required. The line, which will move fuel oil from refineries at Suez to the Egyptian capital, will be state owned and will cost about E£3,000,000 ($8,640,000). The government's long-range plans call for erection of a 20,000-bbl. daily refinery at Cairo.

Gas Use Planned

Saudi Arabia seeks bids on ammonium sulfate plant

THE Saudi Arabian Government has disclosed plans to construct an ammonium sulfate and dry ice plant which will utilize natural gas from oil fields of Arabian American Oil Co.

The plans were outlined in an invitation for bids prior to February 1. The proposal calls for a plant with a capacity to produce 400,000 metric tons annually of ammonium sulfate and 500 metric tons annually of dry ice.

If the project materializes, it will be the first important commercial use of natural gas in the Middle East. The producing companies in the Middle East now utilize gas within their own organizations for utilities, pump drives, and field uses, leaving a large excess which must be flared.

The Saudi Arabian Government project is designed to provide ammonium sulfate fertilizer which is badly needed within the country. The government's bid announcement mentioned that raw materials would be gas from Qatif and Dhahran fields and gypsum and anhydrite from deposits near Al Kharj.

Two Qatif zones . . . Aramco has some 20,000,000 cu. ft. daily available from the two zones in Qatif where production is running 35,000 to 40,000 bbl. daily with a gas-oil ratio of about 500. Most of the gas produced in Dammam field at Dhahran is used for domestic fuel, for boilers and in other company operations.

Studies have been made in the past on gas utilization in the Persian Gulf, but most of the projects considered have been regarded as uneconomic if undertaken by a private company. Aramco itself is completing a large pressure-maintenance project which will utilize Abqaiq field gas.

The bids being asked by the Saudi Arabian Government cover delivery and erection of the entire plant, complete with site preparation, services, housing, foundations and other facilities, guaranteeing turning over the project to the government as "turn-key" job fully operating.

Iran May Return Soon

Eight companies work out tentative plan for marketing oil from nationalized properties; Iran prepares for settlement

Dahl M. Duff

THE seriousness of the current effort to settle the Iranian oil discovery was reflected in preliminary moves being made last week in London and Teheran.

The way toward commencement of formal negotiations was being further cleared with these two developments:

. . . In London, officials of the eight international oil companies with interests in the Middle East met in closed conferences to work out tentative plans for returning Iranian oil to world markets.

. . . In Teheran, the existing Parliament was dissolved and new elections scheduled by the government. This was regarded as a move to provide the Zahedi Government with machinery for legislative approval of the eventual settlement terms.

Within the industry, there seemed to be more optimism over the prospects of agreement than at any time in the more than 2½ years since Iran nationalized the properties of Anglo-Iranian Oil Co., Ltd. Early last month Iran and Britain agreed to resume diplomatic relations in what was considered another preliminary step toward an oil settlement.

Understanding reached . . . Reports from London said the companies involved in the week-long conferences had reached a tentative understanding for the marketing of Iranian oil whenever any settlement is reached. The agreement apparently provided only the framework of a marketing plan with details to be filled in as further progress toward a settlement is made on the diplomatic level. Strict secrecy was being maintained on the exact nature of the agreement.

Companies taking part in the meetings were: Standard Oil Co. (N. J.), Socony-Vacuum Oil Co., Inc., Standard Oil Co. of California, The Texas Co., Gulf Oil Corp., Anglo-Iranian Oil Co., Ltd., Royal Dutch-Shell, and Cie. Francaise des Petroles. Herbert Hoover, Jr., special petroleum adviser to the U. S. Department of State who has recently been sounding out the views of both Iranian and British officials, participated as an observer.

As the meetings got under way, an Anglo-Iranian spokesman said the sole purpose of the discussions was to explore, on a tentative and hypothetical basis, the problems involved if and when Iranian oil should again flow into its traditional Eastern Hemisphere markets. The highest officials of the companies concerned were attending the meetings which presumably had the blessing of the U. S. and British governments.

Whether other large American oil companies without present interests in the Middle East will be asked to take part in the final plan for distributing of Iranian oil remains to be seen. Their absence from the current discussions would seem to support the belief that the marketing plan will not provide for any substantial imports of Iranian oil into the United States. The five American companies with interests in the Middle East are also the only American companies with large marketing organizations in the Eastern Hemisphere.

It was not known if the London meetings went into the many delicate and complex questions involved in an Iranian settlement other than the mere disposition of the oil when production is resumed. These questions include the price at which Iranian oil will be bought, the form of the organization which will assist with or take over actual operations, and possible reductions in production in other Middle East oil countries.

Voting soon? . . . The new Parliament to be elected in Iran will provide a legal basis for the Zahedi Government which took over last August.

Besides providing means for approving an oil settlement, the elections will abrogate the parliamentary immunity of several deputies who have gone into opposition. This will allow the government to curb the activities of Dr. Mozafar Baghai; Hussein Makki, a former Mossadegh lieutenant; and the religious leader and fanatic nationalist, Mullah Kashani.

With the decree authorizing the new elections already signed by the Shah, voting was being set up to begin in the near future. The Parliament which functioned under the Mossadegh regime had only 23 deputies in contrast to the 69 required for a quorum, and, as a result, the Zahedi Government has been without a legislature since it came to power. The preparations for new elections were interpreted as a show of sincerity by the Zahedi regime in arranging a legally valid oil agreement which would have to carry the endorsement of the Iranian Parliament.

Public Has Oil Fever

Rough Range well boosts oil stocks, spurs resumption of drilling on old well suspended by lack of capital

THE West Australian oil discovery by last week had captured the imagination of a large part of the Australian public, although industry officials cautioned that the significance of the find can only be determined through considerable further drilling and development.

The operating company, West Australian Petroleum, Pty., Ltd., jointly owned by Caltex and the Australian Ampol Exploration, Ltd., continued to make hole in the Rough Range wildcat which earlier tested around 550 bbl. daily of light crude. On latest reports the well was drilling below 4,270 ft.

In Canberra, Dr. Harold G. Raggatt, secretary of the Department of National Development, declared that it was inconceivable that this was an isolated discovery and that the sands in which the oil was found were known to exist over a wide area. The company itself has not publicly identified the age of the formations from which production was tested at depths of 3,605-20 ft.

Petrochem industry talked . . . The West Australian state premier told his parliament in Perth that, aside from the value of a potential oil field to Australia, the state government under its petroleum law would receive a royalty of 5 per cent of the gross value of the production for the first 15 years and 10 per cent thereafter. The 340,000 sq. miles of concessions which WAPET acquired earlier comprise most of the sedimentary area of West Australia. Australian business circles already were talking of petrochemical and plastics industries based on petroleum.

George M. Cunningham, president of American Overseas Petroleum, Ltd., Caltex's exploration affiliate, and E. M. Butterworth, a Caltex vice president, arrived in Australia for conferences with commonwealth and state authorities and for an inspection trip to the well location. Earlier, T. L. Lenzen, a Standard Oil Co. of California vice president, was quoted in Sydney as saying $10,000,000 had already been set aside for initial development of the Rough Range discovery.

British interested now . . . As the first apparent commercial oil discovery in all the 2,975,000-sq. mile continent of Australia, the news attracted particular attention through the British Commonwealth. An influential London newspaper commented: "That this first strike is four-fifths an American affair will cause some feelings of disappointment. But that is the luck of the game."

In Melbourne, W. G. Walkley, Ampol president who sought for several years to interest foreign companies in the permits which his company held in West Australia, commented that Britain was given an opportunity to participate but refused it.

"I spent 2 years from 1946 trying to raise capital from Britain but they just weren't interested," he said. "Nobody believed there was oil in Australia. Britain allowed the same thing to happen in Canada." Caltex joined the venture in 1951.

The rights held by Wapet along the coast of West Australia and in the Desert Basin in the north are under five exploration permits good for 2 years but which may be extended at the discretion of the state government. Information from Australia is that the Rough Range area is covered by a prospecting license on 120 sq. miles. The discovery entitles the company to take out a lease with a 21-year term and covering not less than 4 sq. miles nor more than 100 sq. miles. Besides royalties, the lease holder must pay a rental of A£10 ($22.50) annually per square mile.

Oil stocks jump . . . Stock of Ampol Exploration, Ltd., the Ampol subsidiary which holds the 20 per cent minority interest in WAPET, boomed. Other oil stocks in Australia also rose sharply. Ampol Petroleum, Ltd., prepared to sell a new issue at a premium with plans to contribute at least A£800,000 ($1,800,000) for further work in West Australia.

The French Kimberley Oil Co. decided to increase its capital and resume drilling on a well at Nerrima dome, near Broome, in the Ritzroy River Basin of West Australia. The company's test here was suspended in 1950. Its permit area of 550 sq. miles is the only one in West Australia besides those held by Wapet.

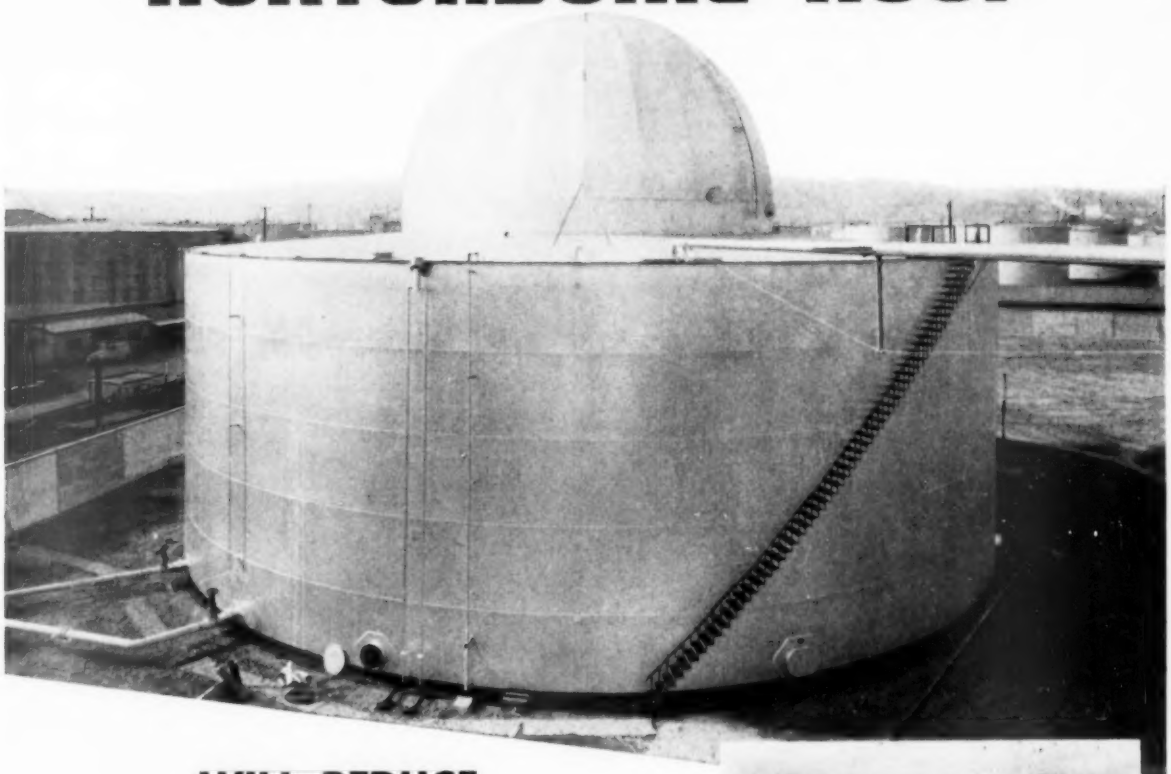
Australian Refinery Showing Progress

This scene illustrates progress in construction of Anglo-Iranian Oil Co., Ltd.'s Kwinana refinery near Fremantle, western Australia. The foundations are for five concrete separators which will remove entrained oil from effluent water before it is discharged to the sea. The completely new 70,000-bbl.-daily Kwinana refinery is the largest of four new refinery projects now under way in Australia.

Errata

In an article, "Preparing Preliminary Job Estimates," by W. W. Bond, in the December 14 issue, page 106, Figs. 1 and 8 were inadvertently transposed. Also, the ordinate of Fig. 2 was omitted. This should have read "Design Pressure, Psig."

HORTONDOME ROOF

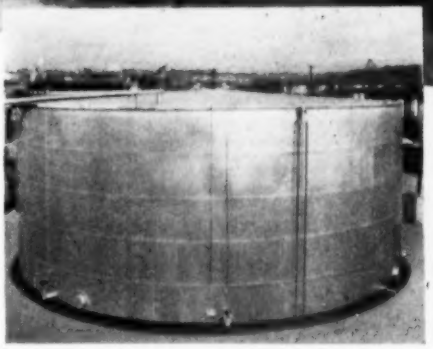


WILL REDUCE EVAPORATION LOSSES FROM EIGHT TANKS

When the current construction program is completed at Shell Oil Company's Harbor Island Terminal in Seattle, Washington, the Hortondome Roof® shown above will be connected to the vapor spaces of eight tanks. As vapor is formed or displaced in these tanks, the flexible hemispherical membrane in the Hortondome will rise to make room for the surplus air-vapor mixture. When conditions causing the expansion or displacement are reversed and the vapors condense back to liquid, the membrane goes back down.

CB&I Field Welding Supervision Service

Every welded steel structure built by CB&I is provided with Field Welding Supervisory Service so that we may build you a better tank! A welding expert is assigned to help the Foreman with the cutting and grading of test plugs, assist with the magnafluxing, x-raying or stress-relieving welded joints, when called for by the specifications and to help check welding equipment and welding techniques.



ABOVE: 59,000-bbl. cone roof tank at Shell Oil Company's Harbor Island Terminal. The vapor space of this tank is connected to the Hortondome Roof. TOP: 81,000-bbl. tank equipped with Hortondome Roof.

Further information, estimates or quotations on Horton tanks or welded steel plate work may be had by writing our nearest office. We will include Field Welding Supervision at *no extra cost* to you!

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Detroit, 26 ..... 1514 Lafayette Bldg.
Havana ..... 402 Abreu Bldg.
Houston, 2 ..... 2119 C & I Bldg.
Los Angeles, 17 ..... 1523 General Petroleum Bldg.
New York, 6 ..... 3347—165 Broadway Bldg.
Philadelphia, 3 ..... 1615—1700 Walnut Street Bldg.
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Look at it this way. With 40-foot pipe you must make 132 joints every mile. But with 50-foot lengths of Armco Welded Steel Pipe you need only 106 joints. So you may be making 26 joints—or 24.5%—too many. Thus by specifying Armco Pipe you not only speed installation but also simplify hauling and handling.

In addition, Armco Welded Steel Pipe is available in a wide range of diameters (6 to 36 inches) and wall thicknesses (9/64- to 1/2-inch). With this wide range you can match your needs exactly—without compromising your requirements or buying useless extra metal.

And with the uniformly beveled ends of Armco Pipe, field welding is simplified and work goes faster.

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ARMCO WELDED STEEL PIPE

ARMCO

Shell's Denver Veep

Alexander heads new area office in Rocky Mountains

WHEN Shell Oil Co.'s newly created Denver area organization swings into action officially next week, the man at the helm will be one whose executive abilities have proved him fitted for the job of welding a new organization into a smoothly functioning unit.

The ability which moved W. A. Alexander from a district engineer in Louisiana to vice president has been evident since August when he moved from Tulsa to Denver to form the new office with personnel from both the West Coast and Mid-Continent areas.

Alexander is known for his faculty of getting along with people and this is reflected in the spirit of cooperation among those who work under him. He dislikes detail and shies away from matters he feels can be better handled by those more closely concerned.

A native of Crowley, La., and a graduate of Louisiana State University with a master's in geology, Alexander joined Shell in 1928 as a district field engineer at White Castle, La. After 6 years as an exploitation engineer, he worked 2 years as chief exploitation engineer and another 2½ years as Louisiana division manager. Transferred to Houston, Alexander served as production manager and later as manager of Shell's Houston area.

He was transferred to Tulsa as area manager in 1947 and was appointed vice president of Shell in July 1951.

Active in various civic organizations and projects, he served on the board of directors for the Community Chest, Y.M.C.A., and the Tulsa Chamber of Commerce. He also served as a member of the board of directors of Mid-Continent Oil and Gas Association and on committees of the American Petroleum Institute.

Alexander's nonprofessional interests include hunting and an enthusiam for golf, which he indulges as often as the weather and his schedule will permit.

H. W. Yeargain, tool pusher with Den-Tex Oil Co., has been transferred from Sweetwater, Tex., to Midland.

Gyle Atterberry, toolpusher for R. W. Rine Drilling Co., has been transferred from Scott City, Kans., to Medicine Lodge, Kans.

James R. Taylor has resigned as vice president and director of W. H. Barber Co., Chicago, effective December 31, to organize a company for the wholesale marketing of chemical specialties. He had been with Barber for 27 years.

Dr. James S. Cross has been named manager of the statistical-research division of Sun Oil Co. He was formerly assistant professor of marketing at Massachusetts Institute of Technology.

L. B. FUGITT

L. B. Fugitt, formerly district geologist for Northern Natural Gas Producing Co. in Amarillo, Tex., has been placed in charge of the firm's new office in Wichita, Kans. **R. V. Moore,** geologist, has been transferred from Bismarck, N. D., to the Wichita office which will supervise all of the firm's exploration and producing activities in Oklahoma, Kansas, and the eastern two-thirds of Nebraska. Northern Natural Gas Producing is a subsidiary of Northern Natural Gas Co. of Omaha.

C. A. Young was awarded a certificate of service by the American Standards Association recently in New York in recognition of his work in standardization. Young, who retired this year as director of the Division of Production of the American Petroleum Institute, was a member of the Standards council, one of the A.S.A.'s two governing bodies, until his retirement last August. He represented the A.P.I., a member-body of the A.S.A. federation.

John C. Wyeth, geologist with Continental Oil Co., has been transferred from Vernal, Utah, to Salt Lake City.

Lawrence E. Barrett, junior petroleum engineer with The Texas Co., has been transferred from Cut Bank, Mont., to Rangely, Colo.

Oliver S. Ambrose has been placed in charge of Tide Water Associated Oil Co.'s economic and petroleum analysis department now headquartered in San Francisco. He previously was in the company's New York office.

Carl M. Fabian has been promoted from assistant general superintendent to general superintendent of Magnolia

C. M. FABIAN

J. L. HEATH

Petroleum Co.'s refinery at Beaumont, Tex. He succeeds **J. L. Heath,** who retires January 1 after almost 39 years with Magnolia. Heath has been general superintendent since 1947. Fabian joined Magnolia in 1919.

H. A. Jackson has been appointed a vice president and chairman of the operating committee of Tide Water Associated Oil Co.'s eastern division, effective January 1. He replaces **Drew L. Hines,** who is retiring. Jackson, whose headquarters will be in New York, will be in charge of all operations of that division of the company. He has been associated with Tide Water for more than 30 years and has been president of Seaside Oil Co., a California subsidiary of Tide Water, since 1947.

Henry F. Newman has been appointed assistant chief engineer at the Standard Oil Co. (Ind.) refinery at Casper, Wyo. He formerly was assistant head engineer of the oil design department of the company's refinery at Whiting, Ind.

Harold P. Hobart, a vice president of Gulf Oil Corp. and various of its subsidiaries, will retire December 31. He is in charge of the company's domestic marketing department's product

PERSONALS

development and product engineering activities. Hobart has been with Gulf for 34 years and was elected a vice president in 1947. Two years later he was appointed to his present position.

COULSON

Jack L. Coulson, production superintendent for Warren Petroleum Corp.'s North Texas region, headquartered in Abilene, Tex., will become manager of the region on January 1. He will succeed **J. Roy Auers,** who is scheduled for a special assignment with the company which will interfere with his present mana-

AUERS

EVANS

gerial duties. **A. J. Evans,** regional drilling superintendent, will be advanced to the newly created position of assistant regional manager. He also will continue to supervise drilling operations. **W. T. Dolezal,** presently production superintendent for the firm's West Texas district at Snyder, Tex., will succeed Coulson as regional production superintendent. **G. G. Lowe,** district foreman at Graham, Tex., will replace Dolezal at Snyder, and **Ralph Ackerman** will become assistant district foreman in the Scurry County area. **W. S. Shropshire** will be assistant district foreman in the Spraberry area, and **Morris Henderson** will become assistant district foreman at Graham.

Charles J. Hoke has been promoted by Murphy Corp. from chief geologist to exploration manager, replacing **M. C. Hoover,** who resigned as vice president and exploration manager to become president of a newly formed corporation which will handle the individual account of **C. H. Murphy, Jr. Glenn Fedderson,** formerly district geologist in Denver, has been moved to the firm's office in El Dorado, Ark., as staff geologist. **Earl B. Austin,** formerly in Midland, Tex., has replaced Fedderson in Denver.

Cecil G. Lalicker, formerly professor of geology at the University of Kansas, has been made chief geologist for Mayfair Minerals, Inc., with headquarters in McAllen, Tex.

James A. Masterson, formerly with Stanolind Oil & Gas Co. in Billings, Mont., has joined Canada Southern Oils, Ltd., as geologist in Casper, Wyo.

C. Herbert (Bud) Griffin, Jr., has resigned as division superintendent for Phillips Petroleum Co. at Casper, Wyo., to join R. L. Manning Co., Denver drilling contractors.

Charles Ashmun has been appointed to the newly created position of supervisor of oil movements for Buckeye Pipe Line Co., effective January 1, with headquarters in the general offices at Lima, Ohio. He joined Buckeye in 1939 and was appointed assistant to the oil-traffic manager in 1948. In 1950, he was made assistant to the vice president and was in charge of industrial relations.

J. W. Morgan has been appointed assistant manager of manufacturing at the head office of British American Oil Co., Ltd., in Toronto, Ont. **J. A. Hardy,** formerly assistant manager, has replaced him as manager of the firm's Montreal East refinery. **C. W. Coote** has been transferred from manager of the Calgary refinery to the Montreal East plant as assistant manager. **B. A. Barnhill** has been made manager at the Calgary refinery, while **H. S. Sparrow** replaces him as assistant refinery manager at Edmonton.

M. J. Rathbone, president of Esso Standard Oil Co. and a director of Standard Oil Co. (N. J.), has been elected president of the parent company, replacing **Eugene Holman,** who will become chairman of the Jersey Standard board January 1. Holman succeeds **Frank W. Abrams,** whose retirement January 1 was announced last week. In other changes, **Chester Smith,** a vice president and director of Jersey and head of its manufacturing and refining department, was elected to the executive committee, and **Lloyd W. Elliott,** a director, was named vice president to succeed **Orville Harden,** who is retiring January 1 after 43 years with Standard. Holman has been president since 1944 and chairman of the executive committee since 1946. Rathbone, with the Jersey organization for 32 years, became president of Esso in 1944 and a director of the parent firm in 1949. In addition to his duties as Standard president, he also will serve as vice chairman of the firm's executive committee.

C. P. Bristol has been promoted by Shell Oil Co. from area manager in Tulsa to vice president in charge of the company's Tulsa exploration and production area. He joined Shell in 1931, became production manager in Houston in 1950, and was moved to Tulsa in the same capacity a year later. He was appointed area manager last August.

W. H. McQuaid, formerly drilling-tool safety supervisor at Midland, Tex., for Magnolia Petroleum Co., has been transferred to Houston in charge of drilling-tools safety operations of the Gulf Coast divisions.

John E. Hathaway, formerly junior geologist with Sohio Petroleum Co. at Midland, Tex., has joined Lion Oil Co. as a subsurface geologist at Abilene, Tex.

N. B. Marchbanks, assistant superintendent of Magnolia Petroleum Co.'s refinery in Fort Worth, will become superintendent on January 1, succeed-

N. MARCHBANKS

J. D. WALL

ing **J. W. Folmar,** who will retire after having been superintendent of the refinery for nearly 15 years. Marchbanks will be replaced by **J. D. Wall,** presently assistant to the mechanical superintendent at Magnolia's refinery in Beaumont, Tex. Marchbanks joined the company in 1916 and has been assistant superintendent since 1935. Folmar has been associated with Magnolia since 1912.

W. O. Tyson, who has been operating as an independent in the Fort Worth area, has been named manager of Lee Geophysical Survey Co.'s new office in Fort Worth.

Joseph T. Kent, formerly principal oil and gas valuation engineer in Dallas for the Internal Revenue Service,

PERSONALS

has retired after 30 years to become a consultant in Dallas. Before joining the Bureau of Internal Revenue in 1923, he worked as a geologist for Producers Oil Co. and The Texas Co. in Oklahoma, Kansas, Louisiana, Texas, and Venezuela.

R. W. McOmie has been appointed manager of Shell Oil Co.'s new refinery now under construction at Anacortes, Wash. He is presently manager of Shell's refinery at Wilmington, Calif., but will devote his full time to coordination of activities in connection with the new project, and the development and training of the operating organization during the construction period. McOmie joined Shell in 1927 as a chemist at its refinery at Martinez, Calif., and was made manager of the Wilmington refinery in 1945. He will be replaced at Wilmington by **P. J. Merkus,** assistant to the vice president in charge of manufacturing in New York. The changes are effective on or about January 1.

R. W. McOMIE

P. J. MERKUS

A. E. Brainerd, formerly Rocky Mountain regional geologist for Continental Oil Co., and **Dr. F. M. Van Tuyl,** head of the department of geology at Colorado School of Mines for many years, have opened offices in Denver and Golden, Colo., as consultants in petroleum and engineering geology.

J. M. Keith has been promoted by Royalite Oil Co., Ltd., from field manager of operations at Coleville, Sask., to manager of crude-oil supply and transportation. He is being replaced by **D. D. Wright,** formerly production superintendent at Turner Valley, Alta. **J. A. Harvie,** field manager at Edmonton, has been transferred to Calgary as general superintendent of production. Turner Valley's new production superintendent is **A. G. Kennedy,** formerly general production foreman at Edmonton. **Gunnar Haugrud,** district geologist, will be in charge of all company activity in the Edmonton area.

J. W. Rettig, Jr., independent operator, has moved from Billings, Mont., to Lafayette, La.

John J. O'Keeffe has resigned as general field superintendent for The Texas Co. at Bogota, Colombia, to become a consulting petroleum engineer and geologist in Compton, Calif.

William H. Roe has joined Tide Water Associated Oil Co. as chief reservoir engineer at Regina, Sask. He had been vice president and general manager of Stanford Petroleum Corp., in Evansville, Ind.

Jack D. Duren, formerly exploitation engineer for Shell Oil Co. at Glendive, Mont., has been transferred to Billings, Mont., as division logging engineer.

Hugh McCain, Jr., has been promoted by Atlantic Refining Co. from seismic party chief in the West Texas-New Mexico region to district geophysicist at Jackson, Miss.

R. G. Daley, formerly exploitation engineer at Wichita Falls, Tex., for Shell Oil Co., has joined C. L. McMahon, Inc., as production superintendent at Oklahoma City.

O. D. Harper, manager of Carter Oil Co.'s eastern division at Mattoon, Ill., will become assistant manager of production on January 1. **John M. Sprague,** company comptroller, Tulsa, will succeed him as eastern division manager. Harper has been with Carter 29 years.

Rex L. Dawson has been appointed general manager and a director of Interprovincial Gas Grid, Ltd., Calgary, Alta. Dawson joined Carter Oil Co. in 1918 and in 1947 was transferred to Calgary as manager of the land and scouting departments of Imperial Oil, Ltd. He retired on January 1 of this year because of ill health but planned to return to the oil industry after recovering his health.

Gilbert C. Tompson, petroleum engineer, formerly with Sinclair Oil & Gas Co. at Midland, Tex., has joined Meyer & Achtschin in Dallas.

C. V. Booth, Shell Oil Co. geologist, has been transferred from the company's headquarters in Seattle, Wash., to Ventura, Calif. Other geologists moved from Seattle include: **D. W. Gillespie** and **J. A. Johnson** to Sacramento; **J. H. Merrow** and **Q. C. Herbrew** to Salt Lake City; and **D. A. Preston** to Long Beach. **F. B. Loomis** has been transferred from Los Angeles to Salt Lake City.

A. Sherrill Motsch, gelogist with Ohio Oil Co., has been transferred from Rawlins, Wyo., to Cody.

Robert O. Vesper, geologist with Carter Oil Co., has been transferred from Jackson, Miss., to Decatur, Ala.

Max Newsom, exploration geologist formerly with Gulf Refining Co. at Harvey, La., has been transferred to Gulf Oil Corp. at Houston.

Arthur Barry, formerly vice president with New Ulm Corp. at Columbus, Tex., has joined Superior Oil Co. as production engineer at Lafayette, La.

F. A. Schurtz has been promoted by Shell Oil Co. from senior exploitation engineer at Casper, Wyo., to production superintendent at Billings, Mont.

Charles W. Allen, assistant chief geologist of William Ross Cabeen & Associates, consulting geologists for Macmillan Petroleum Corp., has been sent to Palermo, Sicily, as resident geologist on Macmillan's 30,000-acre concession in southwestern Sicily.

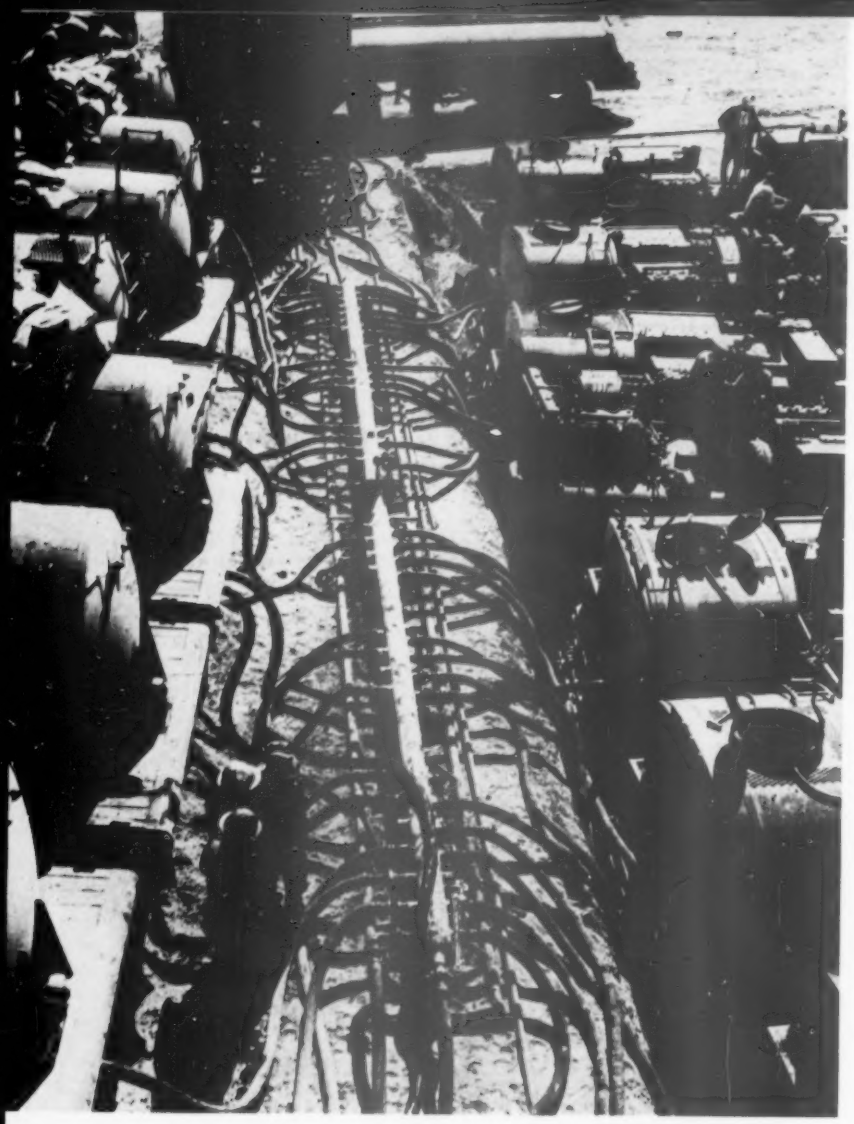
DEATHS

Leo John Beckman, 60, Rocky Mountain district manager of Sinclair Refining Co. since 1950, died December 21 in Denver. He joined Sinclair in 1919.

John L. Bryan, 69, independent operator, died December 19 in Chickasha, Okla. He had been active in the oil industry for 43 years. Before becoming an independent operator in 1929, he was district superintendent in the land department of Carter Oil Co.'s southern Oklahoma division.

Dr. Leonard J. Neuman, 53, consulting geologist and petroleum engineer, died December 18 in Houston. He was a past president of the Texas Research Association.

John C. Albright, 65, formerly with Shell Oil Co., Phillips Petroleum Co., and Skelly Oil Co. as a production and natural-gasoline plant superintendent in Mid-Continent fields, died recently in Santa Monica, Calif., following a heart attack.



New Technique Successful in . . .

Recovering Spraberry's Reluctant Oil

Southern Production Co.'s procedure, still in experimental stage, uses large-volume, high-injection-rate hydraulic fracturing

by Thomas P. Brooks and Warner E. Life
Production superintendent — Senior petroleum engineer
Southern Production Co., Inc., Fort Worth

EDITOR'S NOTE: The huge Spraberry Trend Area field of West Texas has been, from technical and economic standpoints, one of the most controversial oil-field developments of the past 20 years. Principal reasons have been the unusual reservoir conditions, difficult completion problems, and the generally poor performance of the wells. Accordingly, there has been extremely high interest in means of improving oil recoveries, well completions, and in prolonging flowing life.

This significant article describes a new type of fracture treatment now in experimental use in Spraberry well completions, wherein Southern Production Co., Inc., personnel are:

- **Using large-volume high-injection-rate treatments to increase penetration into the Spraberry fractures. Coupled with increased erosive action from the sand carried in suspension for better "propping," this may achieve the desired effect of opening up existing fractures over a larger drainage area, and expose a greater portion of oil-productive Spraberry formation to the well bore.**

- **To obtain high injection rates and treating volumes, large-capacity pumping equipment is used, and friction is reduced by treating "down the casing."**

- **For streamlined hookup of multiple pumping units, a special well-head manifold was designed. This permits a connection from each pump truck direct to the well head, thus further minimizing friction.**

- **High pump efficiency is obtained by positive flooded suction. This is accomplished by (1) placing the pump trucks 5 ft. below ground level, (2) installing the suction manifold at ground level, and (3) elevating the tank trucks some 5 ft. aboveground. These improved pumping arrangements have secured fracturing fluid injection rates that run as high as 66 bbl. per minute.**

- **RESULTS — Using the new treating method, Spraberry wells formerly of low production (25 or less bbl. per day), now after treatment are showing productive capacities of 100, 200, and 300 bbl. per day.**

FRACTURING EQUIPMENT PLUS! Foreground shows pump lines from each of the seven trucks going toward well head; the seven pump trucks in the "slot," and flush tanks at each side. There are seven trailer mixers containing sand and oil on the elevation showing at the rear.

SPRABERRY reservoir rock is generally conceded to be a fine-grained sandstone, tightly cemented and highly fractured. The porosity of the matrix rock is very low and the consensus is that there is an interconnected fracture system. Experience has shown that recovery per well will be low, especially where development has been on 40-acre spacing, and that the life of the wells will be short, unless some means is found (such as water imbibition on which experiments are currently under way) of artificially increasing recovery. This prompted a type of fracture treatment which has recently been employed experimentally by Southern Production Co., Inc., in the general Pembrook North section of the Spraberry Trend Area field.

History Prior to Treatment

Wells drilled by the above operator have been completed in the upper part of the Spraberry formation and casing was set in most instances on top of the formation; some wells were completed in open hole and some with liners set on bottom. All initial completions included conventional fracture treatments ranging between 1,500-4,500 gal. of treatment fluid carrying 1 lb. of sand per gallon. Those treatments were injected through tubing at rates of 7 to 8 bbl. per minute and flushed with 100 bbl. of lease crude. Initial production ranged between 75 and 585 bbl. of oil per day with gas-oil ratios of 300 to 1,200. No water production was indicated on initial completions. Most of the wells covered by this article were completed during late 1951 and early 1952. Production declined rapidly, so that immediately prior to the April 1953 shutdown order issued by the Texas Railroad Commission for the Spraberry Trend Area field, the average daily productive capacity per well ranged from 17 to 96 bbl. of oil, averaging 5 per cent water. Gas-oil ratios at that time were in the range of 950 to 8,900. All of these wells flowed initially, but at this time three of them were being pumped.

Development of Method

The operator's initial experience with sand and oil treatment was in Oklahoma several years ago. It was there that pump efficiencies were tested, various sand-grain sizes were tried, different types of sand-carrying oils were tested, various volumes of flush following sand and oil were used, and high injection rates were employed where possible. Initial results were encouraging and experimental work was continued.

After basic experience in sand and oil treatment in Oklahoma, similar work was undertaken in Wyoming. Here a different set of rock characteristics existed in that the producing sands were of low porosity and permeability, extensively fractured, and interbedded with shale. Successful treatments resulted so the next logical move was to the Spraberry Trend Area field were analogous situation exists.

Increases in production from initial treatments in Spraberry wells had been fairly satisfactory but short lived, indicating that penetration had not been great and probably was limited to a small portion of the formation which was open. It was thought that the use of large-volume, high-injection-rate treatments, with resultant increased penetration into the fractures, erosive action from sand carried in suspension and whatever "propping" may result, might have the effect of opening up the existing fractures over a larger drainage area around the well bore, so as to affect a greater portion of the formation exposed in the hole and break down any existing water, mud, or cement block in the vicinity of the well bore. It was therefore decided to try such fracture treatments experimentally to determine the actual results.

Problems involved in obtaining high injection rates, handling large volumes, high pressures if encountered, and elimination of friction as much as possible had previously been at least partially

HIGH-PRESSURE WELL-HEAD MANIFOLD. Note tiedown for pump lines in foreground.

overcome in such operations in other areas. Friction in the well itself was reduced to a minimum by removing the tubing and treating down the casing. This necessitated a connection to the casing head from the pump trucks. Since a requirement for handling large volumes and obtaining high injection rates is ample pump capacity and the most practical means of obtaining such pump capacity is a multiple hookup of service-company pump trucks normally used in the field, it was necessary to develop a well-head manifold which would permit such a multiple connection (see cut). The development of the well-head manifold, which was constructed to withstand any pressures which might be expected, permitted a direct connection from each pump truck to the well head, thus minimizing friction. The problem of vibration being transmitted to the casing was substantially overcome by devising a tiedown for the manifold. Vibration was reduced further by use of a tie-down clamp, placed a short distance from the well head, in which discharge lines from the pump trucks are securely fastened.

Work on the problem of pump performance led to the devising of a horizontal suction manifold (see cut) to supply a common suction of all pump trucks to obtain a continuous supply of fluids used during treatment. Into this suction manifold are connected all the trucks containing premixed sand and oil as well as tanks containing lease crude oil for loading the hole, breaking down before and flushing following injection of the fracturing medium.

The need for uninterrupted loading of pump suctions indicated the desirability of having the tanks and tank trucks at a level above the manifold and the manifold at a level above the pump suctions. This was accomplished by placing the pump trucks approximately 4 to 5 ft. below ground level, leaving the suction manifold at ground level, raising the tank trucks approximately 5 ft. above ground level, and setting 300-bbl. loading and flushing-oil tanks on 5-ft. substructures.

The ultimate goal was the attainment of high injection rates and as a result of this hookup and setting of equipment, measured injection rates of 66 bbl. per minute have been obtained (see Table 1). The results from wells treated with these high injection rates have, in a measure, apparently accomplished the desired increased penetration and possible erosive effect necessary to increase drainage into the well bore.

It is believed, on the basis of results to date, that a large volume of flushing crude oil (200-300 bbl. or more in excess of the casing capacity), injected at a high rate, following the injection of sand and oil mixture, has helped make it possible to penetrate farther from the well bore and to remove any loose sand from its vicinity.

Various carrying fluids had previously been used experimentally to determine which oil would best carry medium-grained Ottawa sand throughout the treatment and flushing without losing its carrying qualities under prevailing temperatures and velocities. A refined oil of the following qualities has been used: 1.004 sp. gr., 1.46 carbon residue, 5 ft. per minute settling rate at 150° F., and 87 viscosity (S.s.U.) at 150° F.

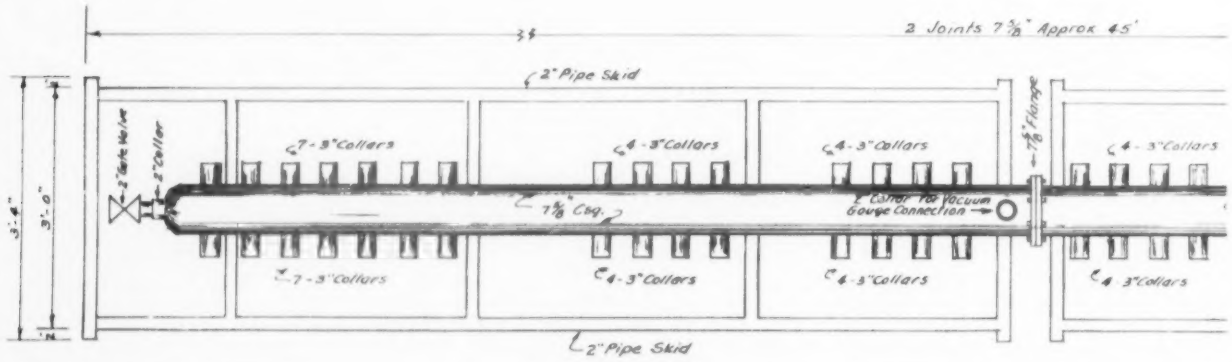
TABLE 1—STATISTICS OF FRACTURE TREATMENTS

Well	Date of treatment	Formation breaking pressure (psig.)	Oil, gal.	Sand, lb.	Maximum treating pressure (psig.)	Maximum injection rate, bbl. per min.	Flushing oil in excess of casing capacity (bbl.)
A	6-20-53	0	20,000	30,000	750	18.2	197
B	9- 8-53	600	18,660	27,990	950	36	224
C	10-11-53	700	20,000	30,000	850	31.6	206
D	10-29-53	700	21,000	31,500	925	29.4	180
E	11- 8-53	800	21,000	31,500	1,175	55	295
F	11-16-53	1,200	21,000	31,500	1,800	32	309
G	11-21-53	850	21,000	31,500	1,100	55	439
H	11-26-53	1,000	21,000	31,500	1,100	66	399

TABLE 2—RESULTS OF FRACTURE TREATMENTS

			Production prior to treatment					Productive capacity after treatment					
Well	Section treated (ft.)	Type of comp.	Method of prod.	Choke size (in.)	Oil, B/D	Water (%)	G.O.R., cu. ft. per bbl.	Method of prod.	Choke size (in.)	Oil, bbl.	Water (%)	Cu. ft. per bbl.	No. days after treat.
A	7,164-7,420	Open hole	Pumping		16.6	20	946	Pumping		58	22.0	1,354	‡85
B	6,992-7,220	Csg. perf.	Dead					Flowing	24/64	217	0.6	2,600	‡32
C	7,163-7,334	Liner perf.	Pumping		14	12	4,526	Flowing	18/64	91	16.0	1,580	‡37
D	7,219-7,484	Liner perf.	Flowing	16/64	13	10	4,028	Swabbing*		101	40.0		18
E	7,147-7,410	Liner perf.	Flowing	16/64	26	10	8,876	Swabbing*		86	35.0		14
F	6,946-7,200	Liner perf.	Flowing	17/64	33	4	2,752	Flowing	20/64	231	0.4	1,567	8
G	7,190-7,460	Liner perf.	Flowing	17/64	60	8	6,129	Flowing	24/64	159	12.0	920	6
H	7,202-7,456	Liner perf.	Flowing	17/64	65	10	3,292	Flowing	32/64	†343	3.0		4

*Swabbing 10 hours per day. †Flowing load oil. ‡Produced during test period granted by Railroad Commission, with overproduction to be made up out of future allowable.



TOP VIEW

Method as Applied in Spraberry

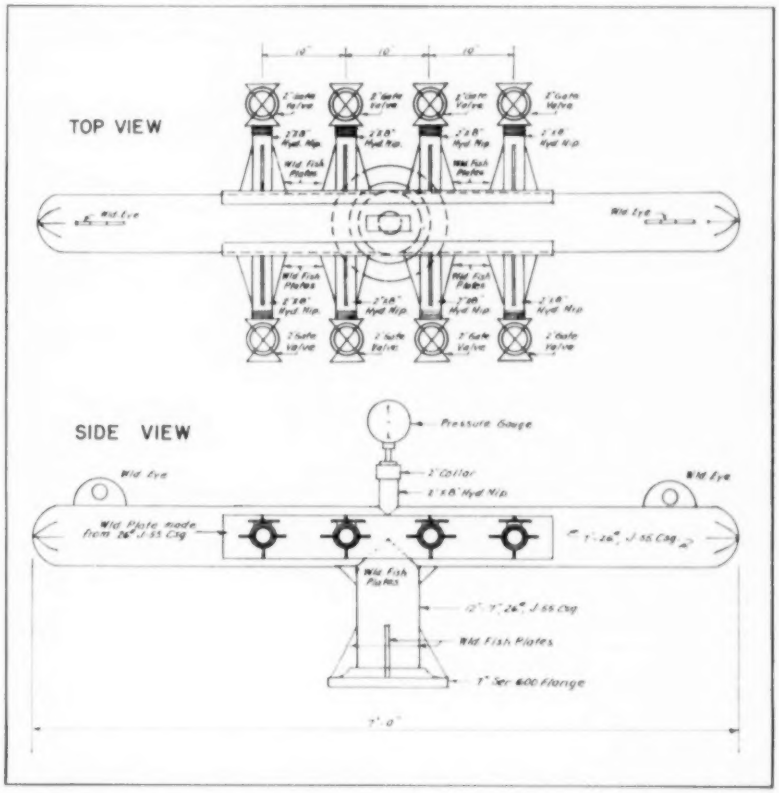
One of the more successful treatments was injected down the casing in a well completed through 7-in. casing perforations 6,992-7,220 ft. Six pump trucks were set 5 ft. below ground level and hooked up to the well-head manifold. Seven tank trucks containing 18,660 gal. of premixed sand and oil (1½ lb. of sand per gallon) were set on a mound approximately 5 ft. above ground level, lined up in a row parallel to the pump trucks, and tied into the suction manifold at ground level between the rows of trucks. Two 300-bbl. welded tanks containing lease crude oil were set on 5-ft. substructures, one at each end of the suction manifold. The formation broke at 600 psig. using 272 bbl. of lease crude oil which was injected at a rate of 27 bbl. per minute. The lease crude oil was immediately followed with 12 bbl. of refined oil in turn followed by 18,660 gal. of the same refined oil carrying 27,990 lb. of medium-grained Ottawa sand. Maximum injection pressure of the mixture was 950 psig. and injection rate was 30 bbl. per minute. The sand and oil mixture was immediately followed with 508 bbl. of lease crude oil at a maximum pressure of 400 psig. and an injection rate of 36 bbl. per minute. This flushing oil volume was 224 bbl. in excess of the casing capacity. Pressure at the end of the treatment was 600 psig.

The well was then hooked up to the flow line and 2 bbl. of load oil flowed back to the tank battery before flow ceased. The hole was then measured and found to be clean to bottom. After removing the blowout preventer equipped with blind rams, which was mounted on the casing head immediately below the well-head manifold, tubing was rerun through a stripper rubber and a packer set. After swabbing for 3 days, the well started flowing at the rate of 356 bbl. of fluid per day, cutting 1 per cent water, through a 32/64-in. choke at 100 psig. tubing pressure. Prior to treatment the well was dead.

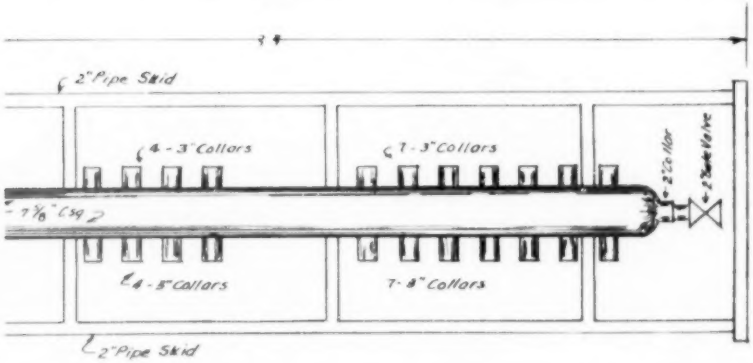
The well was flowed for 22 days, producing against future allowable, during a test period granted by the Railroad Commission of Texas upon recommendation from its engineering staff, at the end of which period the well was flowing through a 24/64-in. choke with 240-500 psig. tubing pressure at the rate of 218 bbl. of fluid per day, cutting 0.6 per cent water, and with a gas-oil ratio of approximately 2,600.

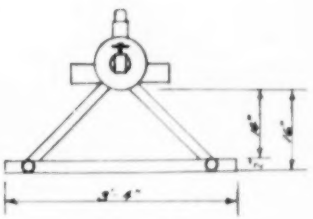
Conclusions

Short-term results after treatment indicate that a substantial increase in current production rate can be achieved by application of the method which has been discussed (see Table 2). There is an insufficient background of performance to allow firm predictions as to future behavior of the wells. However, results of these large-volume, high-injection-rate fracture treatments indicate that increased penetration has probably been achieved, resulting in better drainage which may lead to more effective utilization of reservoir energy and to increased recovery.



WELL-HEAD MANIFOLD. Dimensional drawing of equipment for fracture treatment. (Southern Production Co., Inc.)





END VIEW

SUCTION MANIFOLD. Dimensional drawing of equipment for fracture treatment. (Southern Production Co., Inc.)

SYMPOSIUM . . . Use of Wire-Mesh Sections in

Asphalt Entrainment Control in Vacuum Pipe Stills

Part 3

Parts 1 and 2 of the Journal's Wire-Mesh Symposium appeared in the issues of November 2, page 82, and November 23, page 94. This third and concluding part of the symposium presents the case histories of Tide Water Associated Oil Co. at Avon, Calif., and Aurora Gasoline Co. at Detroit. For free reprints of the series, write Editorial Department, The Oil and Gas Journal.

. . . Case History—Tide Water Associated Oil Co.'s Refinery, Avon, Calif.

by Glenn H. Gaumer

THE Avon refinery of Tide Water Associated Oil Co. has two vacuum columns in which wire-mesh mist separators have been used with apparent success. The columns are used to make distillate feed for a fluid catalytic cracker from the residuum of straight-run crude stills. They have operated with various numbers of bubble trays, are now operating with a 4-in. thick mist separator and one to three trays in each tower.

Straightrun residuum flow is through preheat exchangers and furnace (where it is heated to just below cracking temperature) to 24-ft. diameter vacuum tower known as No. 1 Feed Prep Unit (Fig. 1). There it is allowed to flash and two cuts are taken — an overhead product for diesel sales and a side cut for cat cracker feed. Bottoms from this unit are preheated in another furnace then flashed into a 15-ft.- diameter tower known as No. 3 Feed Prep Unit. Distillate from this unit is also used as feed for the cat cracker.

The 24-ft. tower was built in 1944. It is of steel construction, with four light-weight split-flow 12 per cent chrome bubble trays. Its construction is shown in Fig. 1. After 1 year of operation, the trays had corroded so as to require replacement. All four trays were replaced in Type 316 stainless steel. Later two additional bubble trays were added to an attempt to reduce carryover of asphalt to the distillate. Drawoff points were added to allow product removal after partial condensation (with reflux) inside the tower. In October 1951 three of the bubble trays were removed and a mesh mist separator was installed where the bottom tray had been. When the mist separator became fouled with coke it was replaced with a new one which traded positions with the second tray. This put one tray below the separator in hopes that the bubble tray would stop the heavier droplets of pitch.

The 15-ft. tower was originally a stripper for bottoms from a thermal cracker. It had two trays, ½-in. steel with ⅜-in.-thick steel risers and 6-in.-diameter cast-aluminum caps. In 1945 the tower was put into the cat cracker feed-preparation service. Corrosion soon forced replacement of the steel trays. Three Type 316 light-weight trays with 3-in. aluminum bubble caps were installed. In June 1951 two of these trays were removed and replaced by a single 4-in.-thick mist separator. Present construction is shown in Fig. 2.

Corrosive condition . . . Corrosive agents in the oil are apparently sulfur compounds and naphthenic acids. Their

Author is project engineer, Tide Water Associated Oil Co., Avon, Calif.

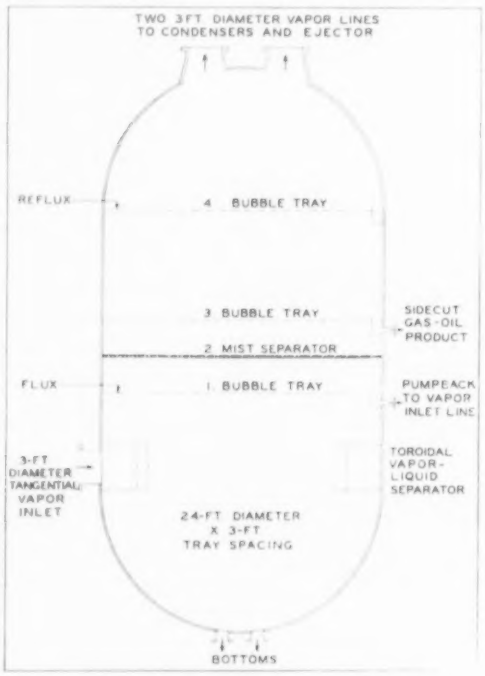


Fig. 1—No. 1 Feed-prep-unit vacuum tower at Tide Water Associated Oil Co.'s Avon, Calif., refinery.

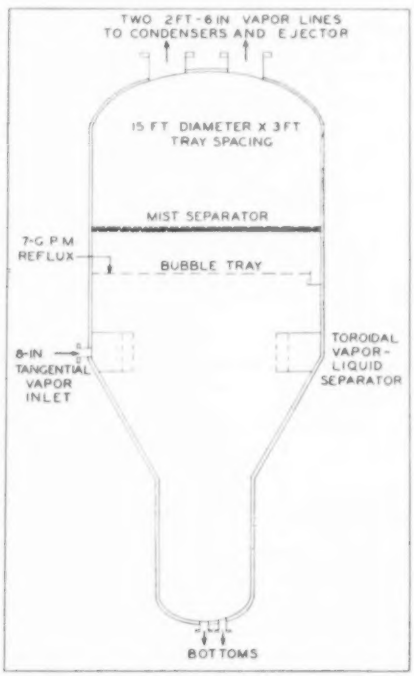


Fig. 2—No. 3 Feed-prep-unit vacuum tower at Avon.

effect shows most in vapor spaces and seems to be proportional to velocity past the surface being attacked.

Corrosion of the 12 per cent chrome took place as fast as on mild steel, therefore all replacements have been in Type 316 stainless which resists the attack quite well. The 15-ft. tower originally had its bottom portion lined with sacrificial steel. It is now lined with Type 316 stainless. The 24-ft. tower was originally unlined except for the periphery of the vapor disengaging torus, which had a sacrificial steel lining. The furnace-to-tower transfer line and the vaporization section have been replaced in Type 316 stainless. The bottom of the tower shell is now lined with Type 316.

Bubble caps of both towers are pressed aluminum. This material resists the corrosive conditions but has very little strength after exposure to operating conditions.

Mesh Sections Installation

The mesh installation is essentially the same in each of the two towers. Each mesh pad is 4 in. thick made of two 2-in. layers of strips about 12 in. wide. They have been made by a knitting process of Type 316 stainless wire, 0.011-in. diameter. Each pad was originally placed immediately above the vapor disengaging torus of the tower, with one or more bubble trays at 3-ft. spacing above it. When the first pad became plugged with asphalt and coke it was moved up 3 ft. and a tray installed below it. There is no evidence for any conclusion as to whether the tray below the pad decreases coking in the pad or not.

The alloy bubble trays were supported by alloy beams on about 2-ft. centers. These beams have been left in place to support the mist separators. The pad is made in strips 2 in. thick by about 12 in. wide. To one side of each piece is wired a stainless support grid made of these parallel ⅛ in. or ¼-in. by 1-in. bars on edge. These bars are held in rigid alignment by ¼-in.-diameter crossrods welded on 6-in. centers. The strips are laid grid side down on the support beams, then a second layer is laid grid side up and oriented at 90° to the first layer. These fill the entire cross-section of the tower with a 4-in. thickness of mesh and with a 1-in. grid on top and bottom. Type 316 stainless wires passed through the grids and mesh and tied around the beams hold down the assembly.

Where a tray is below the mesh there is arrangement for reflux on the tray, either from outside or piped through a hole in the mesh from the tray above. There has been no attempt to put reflux on the mesh.

Mist separator life . . . These vacuum towers normally operate continuously with shutdowns only when black oil becomes entrained in the distillate or when there is other indication of need for maintenance work. The No. 3 Feed Prep tower had excessive carryover 11 months after the first entrainment separator was installed. Examination showed the mesh to be filled with coke except for one spot about 8 in. in diameter where apparently a large portion of the vapor flow had concentrated. This spot had a hole eroded

TABLE 1—NO. 1 FEED PREP VACUUM-TOWER TEST RESULTS

	Before mist separator		After mist separator
	Test C-5	Test C-6	Test D-1
Charge, total bbl. per day	36,404	36,363	35,220
Gravity, °A.P.I.	14.9	14.4	14.5
Viscosity, S.s.F. at 122° F.	200	360	287
Products:			
Overhead, volume per cent	14.6	13.1	13.6
Gravity, °A.P.I.	27.1	26.6	26.2
Side stream, volume per cent	36.8	35.0	43.1
Gravity, °A.P.I.	20.5	20.3	19.8
Bottoms, volume per cent	49.0	51.9	43.3
Gravity, °A.P.I.	7.6	7.8	7.6
Metals analysis on side stream:			
Total ash, p.p.m.		7.0	10.0
Nickel, p.p.m.		0.3	0.3
Vanadium, p.p.m.		0.3	0.2
Color, A.S.T.M.		(†)	+8
Conradson carbon residue, weight per cent	0.12	0.10	0.24
Ramsbottom carbon residue, weight per cent	0.03		
Operating temperatures, °F.:			
Charge furnace outlet	715	741	754
Vacuum tower top	477	482	463
Vacuum tower bottom	689	695	692
Operating pressures, mm. of Hg, abs.:			
Vaporizer section	*78	*72	68
Above No. 1 tray	74	68	64
Below No. 6 tray	60	55.5	61
Top of tower	55	51	56

*Estimated. †Too dark to measure.

TABLE 2—NO. 3 FEED PREP VACUUM-TOWER TEST RESULTS

	Before mist separator	After mist separator	
	Test C-5	Test C-6	Test D-1
Charge, total bbl. per day	17,839	18,871	15,231
Gravity, °A.P.I.	7.6	7.8	7.6
Viscosity, S.s.F. at 210° F.	603	619	1,166
Products, overhead, volume per cent	23.3	27	22
Gravity, °A.P.I.	17.0	17.3	17.4
Bottoms, volume per cent of No. 3 F.P.U. charge	76.6	73	78
Bottoms, volume per cent of No. 1 F.P.U. charge	37.5	38.0	34.0
Gravity, °A.P.I.	5.9	5.3	5.7
Penetration at 77° F.	19	14	11
Metals analysis on distillate:			
Ash, p.p.m.	7.0	11.0	10.0
Nickel, p.p.m.	1.0	1.6	0.95
Vanadium, p.p.m.	0.5	0.3	0.2
Color, A.S.T.M.	(*)	8+	8+
Conradson carbon residue, weight per cent	1.00	1.35	1.10
Ramsbottom carbon residue, weight per cent	0.76	1.24	0.72
Operating temperatures, °F.:			
Charge furnace outlet	760	768	764
Vacuum tower top	644	683	674
Vacuum tower bottom	714	729	720
Operating pressures, mm. of Hg, abs.:			
Vaporizer section		20.5	19.5
Above mist separator			18.0
Top of tower	24.0	19.0	16.7

*Too dark to measure.

through the pad. The mesh was replaced 3 ft. higher with a bubble tray below it.

The No. 1 Feed Prep tower was shut down because of asphalt entrainment after 9 months of the mesh pad service. A large section of the pad and of the alloy bubble tray were out of position, possibly from a vapor surge of large proportions. The pad was partially filled with coke for the lower half of its thickness. It was replaced.

Entrainment pads have lasted as indicated below:

	No. 1 F.P.U.	No. 3 F.P.U.
Date initial installation	Oct. 1951	June 1951
Date first replacement	July 1952	June 1952
Date second replacement	April 1953	April 1953

No pads except the first one in No. 3 F.P.U. have become completely plugged. It is planned to clean the top layers of some of the subsequently removed ones for an attempt at reuse. None have been cleaned to date. Estimated pad life is 1 year and spares of the mesh strips are kept for replacement at that interval. The holddown grids are reused when a new pad is installed.

It is possible to estimate degree of plugging by measuring pressure drop of vapors passing through the pad. This pressure drop is approximately ½ mm. of Hg when the pad is new. When partially plugged the pressure loss may become 1 mm. of Hg or higher.

Shutting-down procedure with the pads in place is the same as before they were used. The tower is thoroughly steamed, then washed with water.

Operating Results

The Avon refinery follows a policy of mixing its crudes in whatever proportions that are available from time to time. This prevents the making of test runs that are strictly comparable to each other because the straightrun residuum composition changes from day to day. The accompanying tables prepared from tests made by the Avon research department give operating data before and after mist separator installations in the two towers (from data supplied by T. W. Kunkel, of the Avon research and development department). Roughly these indicate the following results after the mist separator installations:

1. The side-cut stream (for cat cracker feed) from No. 1 Feed Prep Unit tower increased from about 36 to 43 per cent, with a better color (less asphalt) than formerly.

2. The bottoms from the combined units decreased from about 37 to 34 per cent of the total charge.

3. Penetrations of these bottoms decreased. Daily control tests showed average penetrations of 20+ before demisters became 10 after demisters.

4. The nickel and vanadium (catalyst poisons) concentrations for the products that go to cat cracker feed remained the same, though the depth of flashing increased. Carbon-residue determinations showed the same trend.

The knitted mesh installations at Avon are considered sufficiently successful to warrant the yearly replacements that are needed.

. . . Case History—Aurora Gasoline Co., Detroit

by H. J. Oberling

WIRE-MESH sections have been in use on two vacuum towers at the Aurora Gasoline Co.'s Detroit refinery. No. 1 unit is a 7 and 6-ft. by 39-ft. 6-in. vessel. Details as to location of internals, etc. are shown in Fig. 3. Charge rate to this vessel is 5,000 bbl. per day and tower vapor velocity is in the order of 9 ft. per second. The type of charge is 21° A.P.I. Mid-Continent or 17° A.P.I. Wyoming reduced crude. No. 1 tower operates at 50 to 75 mm. Hg absolute and 750° to 780° F. This vessel is alloy lined to the center well and bottoms piping is constructed of alloy.

Mesh section . . . A single mesh pad is installed in the No. 1 unit. This is Otto York Co. 304 stainless steel, 4 in. thick and with an area of 39 sq. ft. Mesh supports are Type 304 stainless grating and Glitsch truss construction. Fig. 4 shows revamp of tower for installation of mesh section. Trays 7, 8, and 9 were removed and one mesh section and slop tray were installed. Existing Glitsch tower rings and beams were utilized. No alterations were made up the tower and there were no changes in reflux. Mesh section is operated wet with reflux.

Author is associated with Aurora Gasoline Co., Detroit.

Installation of mesh section in the No. 1 unit was made at the beginning of April 1953 and there has been no turnaround since then. Therefore there has been no opportunity to note extent of carbon buildup. Pressure drop has not been checked during operation. No. 1 unit capacity has been increased from 3,500 bbl. per day before mesh was installed to 5,000 bbl. daily after wire-mesh installation.

No. 2 unit . . . This is a 12-ft. i.d. by 66-ft. vessel (Fig. 5). Charge rate is 10,000 bbl. per day with vapor velocities varying from 5 to 9 ft. per

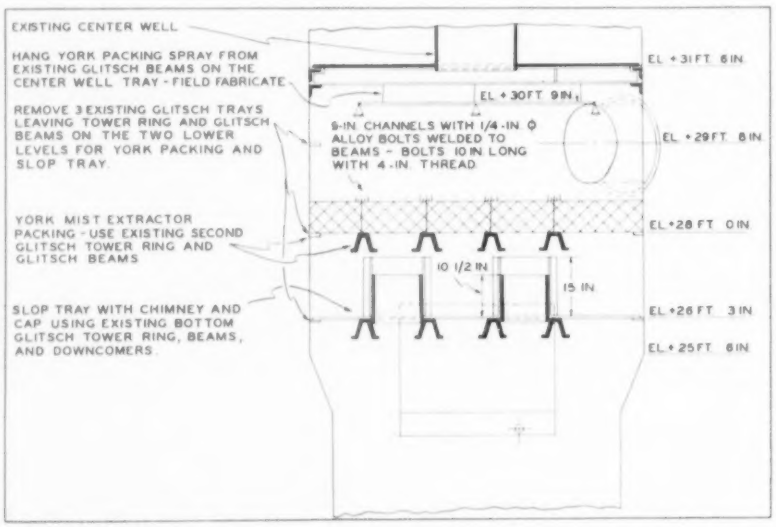

EXISTING CENTER WELL
HANG YORK PACKING SPRAY FROM EXISTING GLITSCH BEAMS ON THE CENTER WELL TRAY - FIELD FABRICATE
REMOVE 3 EXISTING GLITSCH TRAYS LEAVING TOWER RING AND GLITSCH BEAMS ON THE TWO LOWER LEVELS FOR YORK PACKING AND SLOP TRAY.
YORK MIST EXTRACTOR PACKING - USE EXISTING SECOND GLITSCH TOWER RING AND GLITSCH BEAMS
SLOP TRAY WITH CHIMNEY AND CAP USING EXISTING BOTTOM GLITSCH TOWER RING, BEAMS, AND DOWNCOMERS
9-IN. CHANNELS WITH 1/4-IN ⌀ ALLOY BOLTS WELDED TO BEAMS - BOLTS 10 IN LONG WITH 4-IN. THREAD
10 1/2 IN
15 IN
EL + 31 FT 6 IN
EL + 30 FT 9 IN
EL + 29 FT 8 IN
EL + 28 FT 0 IN
EL + 26 FT 3 IN
EL + 25 FT 6 IN

Fig. 3—Aurora Gasoline Co., Detroit refinery No. 1 unit vacuum column is a 7 by 6 by 39-ft., 6-in. vessel.

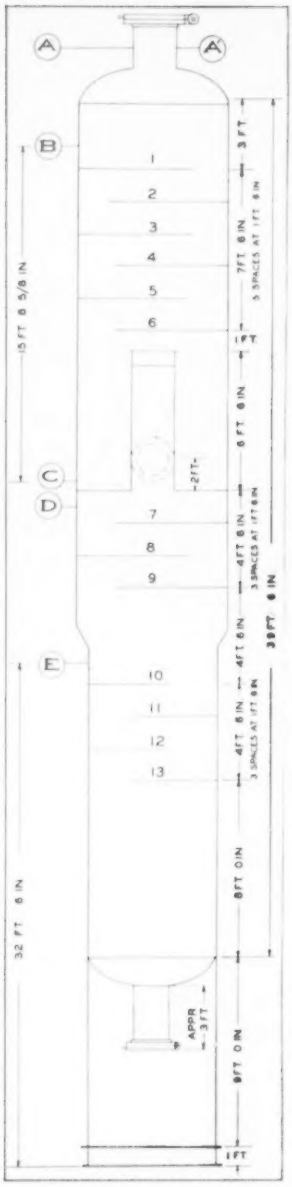


Fig. 4—Revamp of Aurora No. 1 unit showing location of mist extractor.

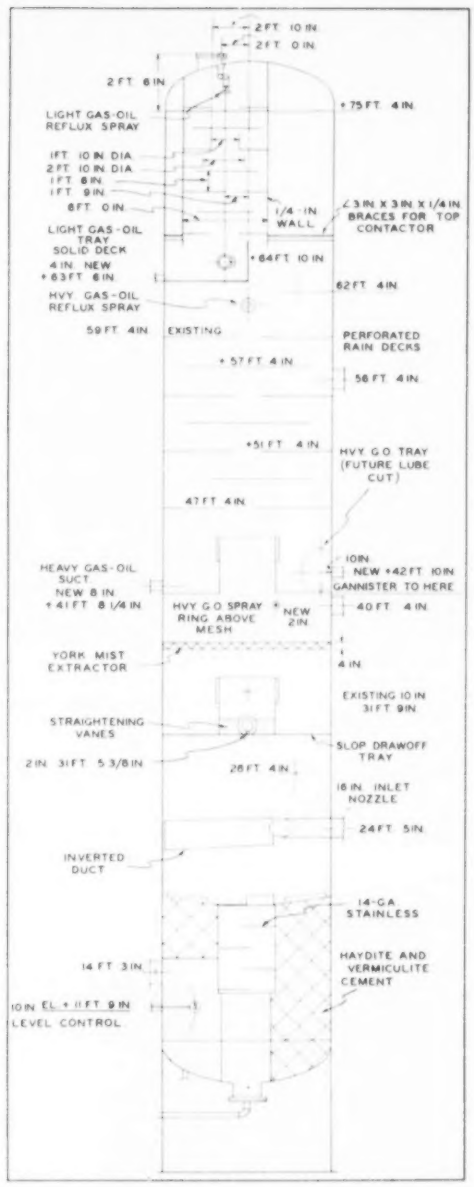

2 FT 10 IN
2 FT 0 IN
2 FT 6 IN
+75 FT 4 IN
LIGHT GAS-OIL REFLUX SPRAY
1 FT 10 IN DIA
2 FT 10 IN DIA
1 FT 8 IN
1 FT 9 IN
8 FT 0 IN
1/4-IN WALL
∠ 3 IN X 3 IN X 1/4 IN BRACES FOR TOP CONTACTOR
LIGHT GAS-OIL TRAY SOLID DECK
4 IN NEW +63 FT 6 IN
+64 FT 10 IN
62 FT 4 IN
HVY GAS-OIL REFLUX SPRAY
59 FT 4 IN EXISTING
PERFORATED RAIN DECKS
+57 FT 4 IN
56 FT 4 IN
+51 FT 4 IN
HVY G.O. TRAY (FUTURE LUBE CUT)
47 FT 4 IN
10 IN NEW +42 FT 10 IN
GANNISTER TO HERE
HEAVY GAS-OIL SUCT NEW 8 IN +41 FT 8 1/4 IN
HVY G.O. SPRAY RING ABOVE MESH
NEW 2 IN
40 FT 4 IN
4 IN
YORK MIST EXTRACTOR
EXISTING 10 IN 31 FT 9 IN
STRAIGHTENING VANES
SLOP DRAWOFF TRAY
2 IN 31 FT 5 3/8 IN
28 FT 4 IN
16 IN INLET NOZZLE
24 FT 5 IN
INVERTED DUCT
14-GA STAINLESS
HAYDITE AND VERMICULITE CEMENT
14 FT 3 IN
10 IN EL + 11 FT 9 IN
LEVEL CONTROL

Fig. 5—No. 2 vacuum unit at Aurora refinery is 12-ft. i.d. by 66-ft. vessel, originally installed with mist extractor as indicated.

second. Charge stock is the same as that to Unit No. 1. The No. 2 unit is operated at 25 to 50 mm. Hg absolute and 730° to 760° F. Tower is ganister lined to center well. Alloy bottoms pump and line to first exchanger are employed. The same type of mesh pad is used as in No. 1 unit (304 stainless) 4 in. thick and with an area of 100 sq. ft. Supports are Type 304 stainless grating.

Since this unit is a new installation with wire mesh installed originally, no comparison can be of before and after capacities.

Ordinarily the mesh section in No. 2 unit is operated wet with reflux. During the first run on No. 2 vacuum unit, which lasted 6 months, the slop pump suction line set up several times, and the material in the slop center well was stagnant for long periods of time. This resulted in coking up the center well. During this same period the York mesh was not sprayed continuously, and a heavy deposit of coke on the mesh resulted. After the first run, the mesh was replaced with new wire and has been in operation for a year now, with no indication of coking.

Contributory results . . . The No. 1 tower is run to between 15° and 12° A.P.I. bottoms and the No. 2 unit to 6.5° A.P.I., 85 penetration asphalt or 13° A.P.I. bottoms.

The metals content of the cat cracker charge coming from the vacuum units has been reduced by a factor of 5 or 6 as shown by emission spectrum analysis.

The product distribution on the cat cracker has improved due to a lower metals content on the catalyst, a higher catalyst activity level, and a heavier gas-oil charge. The weight per cent of propylene has decreased from 10.5 per cent to 8.5 per cent. The weight per cent coke has decreased from 5.1 to 4.5 per cent. Both sets of figures are at a 53 volume per cent conversion level.

At a catalyst rejection rate of 0.25 lb. per bbl. of charge we are able to maintain a weight activity level of 35 on the cat cracking catalyst. Previously, at a catalyst rejection rate of 0.285 lb. per bbl. of charge, our catalyst weight activity was just below 30.

We have been able to increase the charge to the cat cracker from approximately 8,000 bbl. per day to 10,000 bbl. per day at 50 per cent conversion without adding appreciably to the load on the air and gas compressors. This increase was due mainly to cleaning up the charge stock.

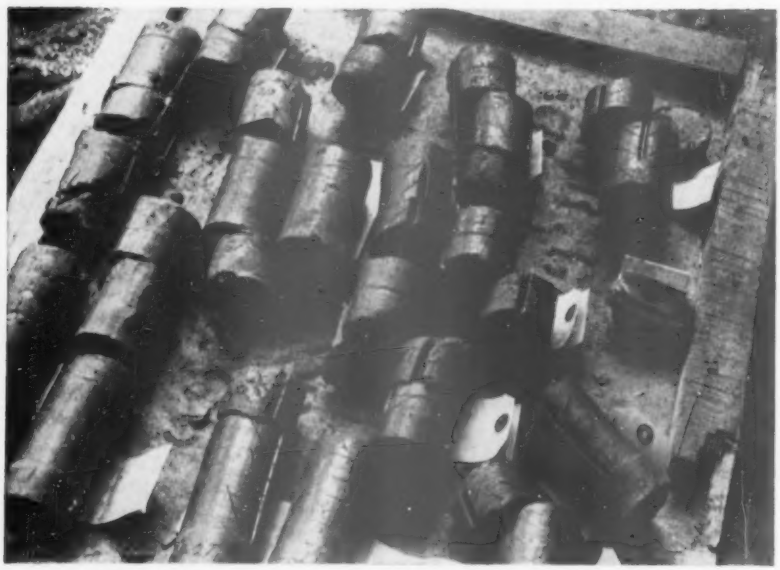
Toxicity of Laboratory Materials

Material—	Threshold limit: p.p.m.	Amount required for 1,000 cu. ft. (ml.)
Nitrobenzene	1	0.1
Aniline	5	0.5
Tetrachloroethane	5	0.6
Carbon disulfide	20	1.4
Benzene	35	3.4
Carbon tetrachloride	50	5.6
Trichloroethylene	100	10.4
Tetrachloroethylene	100	11.8
Turpentine	100	17.4
Methyl alcohol	200	9.4
Toluene	200	24.5
Xylene	200	28.4
Butyl acetate	200	30.4
Amyl acetate	200	34.3
Ethyl ether	400	48.0
Gasoline	500	85.2
	Mg. per cu. m.	Grams
Mercury	0.1	0.0028
Chromic acid	0.1	0.0028
Lead (as PbO)	0.15	0.0047
Zinc-oxide fume	15.0	0.4250

PUNCH-CORE PREPARATION . . . Indonesian members of crew in South Sumatra use 3½-in. ship's auger to drill hole to "fresh" rock formation underground before running light jar-type punch-core assembly to cut oriented stone core. Heavy jungle illustrates necessity of light, portable equipment.

TAKING SAMPLE . . . Light punch-core drill pipe is withdrawn to enable geological party to extract oriented core sample contained within core-cutting barrel which has been jarred into the subsurface formation. Orienting board keeps all equipment aligned to compass North.

Oriented Punch-Core Drilling In Jungle of South Sumatra



ORIENTED CORE SAMPLES . . . Drying rack holds punch cores. Mark made by oriented knife within core cutter is seen, indicating compass North. Top and bottom of each sample are so marked and feathered marks along orienting mark indicate bottom after core is broken into sections, along natural bedding planes of strata. When angle of break across core is measured in coremeter, the geologist can determine direction and degree of dip for underground strata. Cards give map coordinates or core sources.

ONE of the simplest and most economical geological and geophysical methods has been developed and used constantly in Indonesia for the past 20 years by Standard-Vacuum Petroleum Maatschappij's exploration department. Known as "oriented punch-core drilling," it is employed by S.V.P.M. in the inaccessible, jungle-covered areas of South Sumatra, and is given much of the credit for the discovery of that Stanvac subsidiary's oil reserves. Oriented punch-core drilling is also being used by Stanvac petroleum geologists in the hills of Tripura, eastern India.

Previous to the origin of the oriented punch-core method, S.V.P.M. geologists, when hunting for a potential oil-bearing structure, drew their conclusions as to subsurface conditions by inspecting outcrops of rock strata or by digging pits through the surface soils into fresh formations. The geologist made his observations as best he could from the bottom of such pits. This method, complicated by remote locations and difficult terrain, was obviously slow and expensive. Law required, too, that such pits had to be refilled because of the hazard.

A speedier and more economical method was sought for 3 years by Morgan Davis, Chris Hilgers, and Walter Link, whose basic ideas resulted in construction of the first standard

(Continued on page 84)

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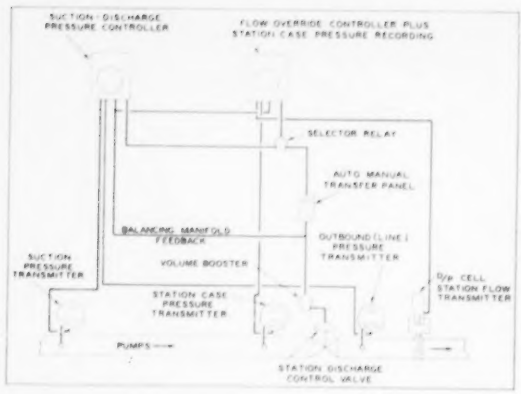
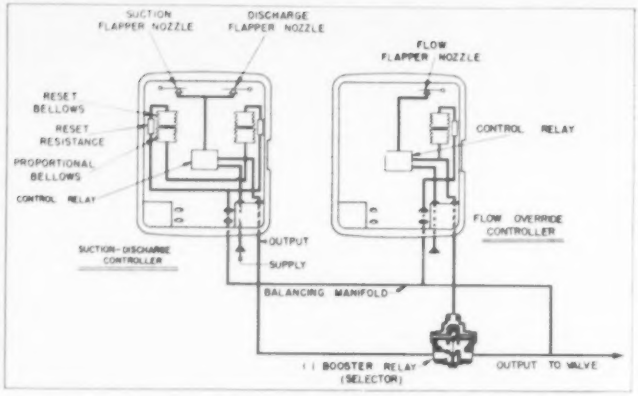


CONTROL SYSTEM utilized in the various stations along the West Texas Gulf Pipe Line. Fig. 1.



AUTOMATIC SELECTOR control system utilizes interconnected suction-discharge pressure controller (left) and flow override controller (right). Fig. 2.

Longest, Largest High-Pressure Crude Line Automatically Controlled

Startup accomplished without instrument trouble

by E. E. Kleir

THE world's present longest, largest high-pressure crude-oil pipe line, operated by West Texas Gulf Pipe Line Co., of Houston, was started up without operating difficulty *(see May 11 issue, The Oil and Gas Journal, page 107)*.

From an instrumentation point of view, the trouble-free startup of the line and its subsequent operation are largely the gratifying results of a carefully engineered control system.

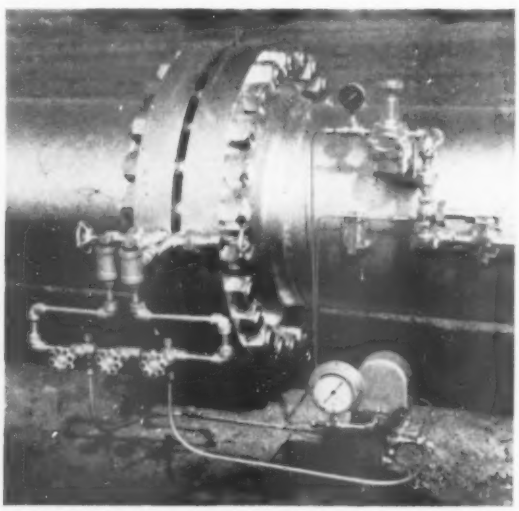
Author is associated with the Houston branch, The Foxboro Co., Foxboro, Mass.

Instrumentation Is Key Factor

The control pattern employed is characterized by simplicity and adherence to certain basic principles which have been proved on other recent large-capacity, motor-driven crude lines.

Each station on the line is fully attended. Automatic control, therefore, involves, only three variables: (1) station suction pressure, (2) station outbound (line) pressure, and (3) station flow. Measurements of all three variables are pneumatically transmitted from the line to the recording controllers in the station. These controllers position the air-operated diaphragm control valve in the station discharge

PNEUMATIC PRESSURE TRANSMITTERS are installed on the individual suction headers. This is the Wortham station.



TYPICAL OUTDOOR differential-pressure cell installation on station flow, West Texas Gulf system.

line to maintain all three of these variables within prescribed limits.

Pneumatic transmission was selected because the five participants in the West Texas Gulf line also operate major refineries where such transmission replaced other modes nearly 15 years ago. Since pneumatic transmission has demonstrated continued reliability and sustained accuracy over this period, it was the logical choice. Another influencing factor was the lower initial cost of the pneumatic system.

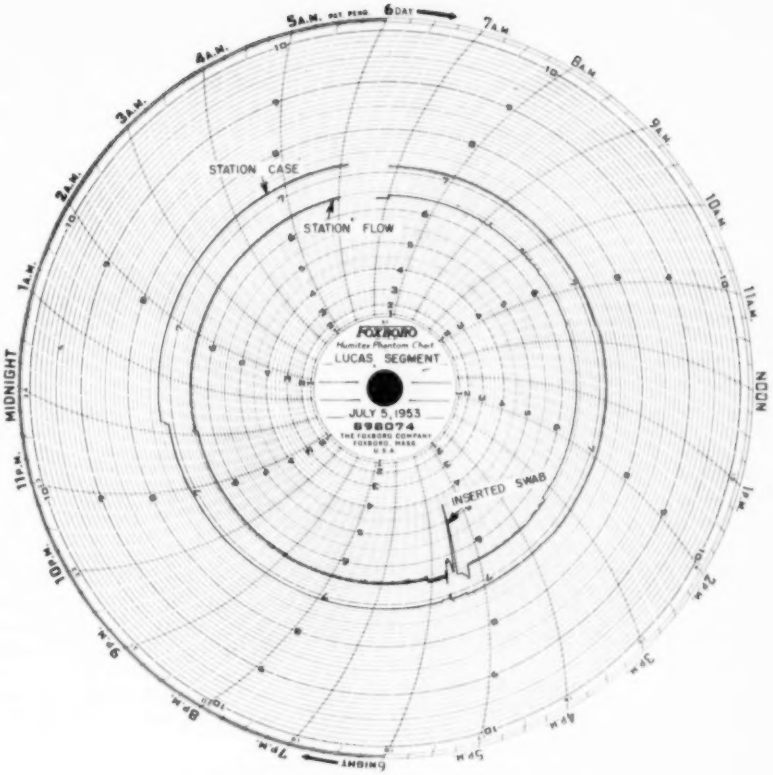
Control system . . . The station control system schematically illustrated in Fig. 1 was designed to maintain continuity of station operation, thus decreasing operating costs. Continuity of pipe-line operation is achieved in three ways: first, by fixing interstation gradients; second, by maintaining normal station pressures and maintaining prime mover power on the safe side of shutdown; and third, by keeping intermediate stations on the line in spite of accidental shutdowns elsewhere.

While it is possible to establish operating continuity in a number of different ways, automatic selector system of control was selected because it represents a fundamentally simple and effective system which can produce transition of control between suction pressure, outbound pressure, and station flow (or motor load) without "bump" or surge. Also, when any variable assumes command of the station it does so by lining out precisely at the set point with a minimum of overshoot. Bumping and overshoot are control upsets which can be of sufficient magnitude to actuate supplementary safety control devices and cause shutdown.

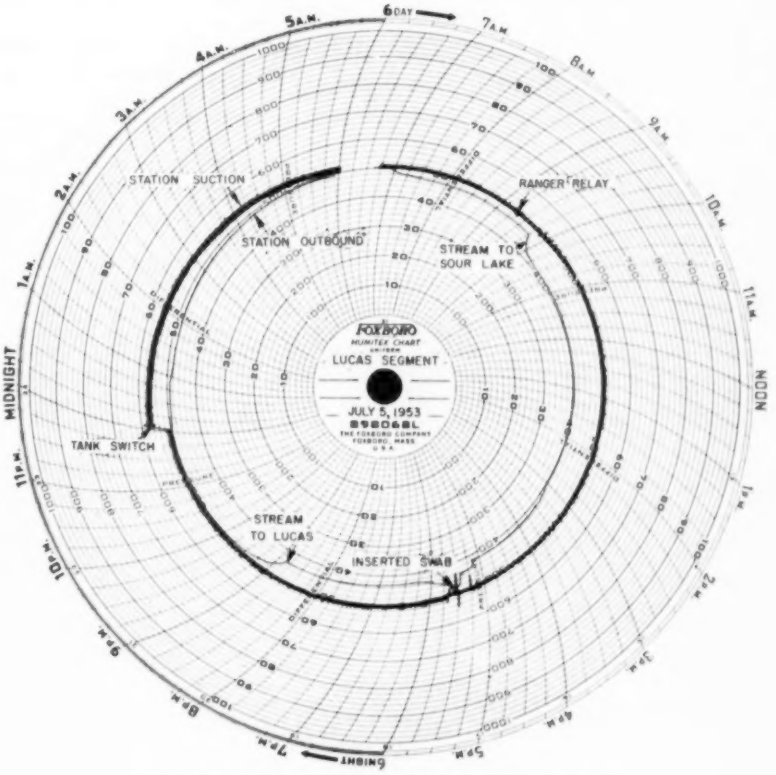
Pneumatic circuit . . . This automatic selector system permits any one of a number of variables to assume control command, provided they are compatible. That is, while one variable is in command, all others must inherently fall on the "safe" side of their respective settings.

Refer to the instrument at the left in Fig. 2, a suction-discharge controller. As the discharge (outbound) pressure increases, the control linkage moves the discharge flapper away from its nozzle, causing the control relay to decrease its output to the station discharge valve. Being spring closed, the valve pinches off to maintain the proper downstream pressure. Any time the downstream pressure is below its set point, this flapper covers its nozzle.

The same holds true for the suction pressure except that here the action is directly opposite. A decrease in suction pressure produces flapper pull-away and a consequent decrease in control relay output pressure. This reversal of



TYPICAL FLOW CHARTS, Lucas station. Fig. 3a.



TYPICAL PRESSURE CHARTS, Lucas station. Fig. 3b.

control action can be accomplished by rotating a single dial in the front of the instrument.

Both nozzle circuits terminate in a common relay. Thus, whichever of the two nozzles exerts the lower pressure will command the relay because, as previously mentioned, the two variables —suction pressure and discharge pressure—are compatible.

Pressure control . . . Assume that station discharge (outbound) pressure is being controlled. The suction-pressure pen is floating above its set point and the suction flapper covers its nozzle, permitting the discharge flapper to throttle and exercise control command. Now suppose that the suction pressure decreases. The suction flapper will start to move away from its nozzle. When the suction flapper and the discharge flapper are the same distance from their respective nozzles, nozzle pressures are identical and the station is about to be controlled on the basis of suction pressure.

Still moving away, the suction flapper starts bleeding the common nozzle circuit to slightly below its former pressure. Responding to this reduced pressure, the relay reduces its output pressure to the discharge control valve. This causes the valve to close sufficiently to maintain the station suction pressure. The reduced valve opening also causes the outbound (discharge) pressure to decrease, causing the discharge flapper to move towards its nozzle. The flapper nozzle positions are now reversed, i.e., suction flapper is now throttling and discharge flapper covering its nozzle.

The control relay output pressure tees off ahead of each respective proportional bellows. The reset bellows are pressured from the output to the control valve through the balancing manifold. Thus, regardless of which flapper nozzle is inoperative, its reset bellows is continually balanced by the operative unit. Even though a unit is inoperative, its reset bellows carries the same pressure as that of the operative unit. This is the prime reason the transfer from suction to discharge control and vice versa, is accomplished smoothly and free of bump. No overshoot can occur past the set point, such as is characteristic of suction-discharge pressure controllers with proportional action alone. The reset bellows, then, are responsible for the smooth transfer of control, accomplished without causing upset in the line or the station.

Flow override . . . On crude and products lines of smaller capacity, automatic suction-discharge pressure control alone often suffices. This requires only the single instrument illustrated at the left of Fig. 2. The balancing manifold is eliminated and the control relay output also tees into each left-hand and right-hand reset resistance such that each of these resistances is located between the point of pressure entry and its reset bellows. This now represents a basic instrument which produces exactly the same smooth transition of control from suction to discharge and vice versa, as just described.

As previously mentioned, large crude lines find it advantageous to limit control, a third variable—either flow rate or motor load—in addition to station suction and discharge. Such control promotes economical operation where large electric prime movers on the order of 2,000 hp. are employed, such as on West Texas Gulf. Costly power demand rates, occasioned by slack or empty lines on startup, are thus avoided. Motor windings are protected against overload currents.

In case of a line break, flow rate limiting action is practically instantaneous, whereas it would take relatively longer time for the effect to be detected and corrected through station suction control. Flow rate control can also be employed directly as the main station control, as will be seen in a later section.

Direct flow control . . . Both approaches, motor load and direct flow rate, were equally considered by West Texas Gulf. For a given flowing gravity the two variables are directly related to each other. However, there were a number of reasons why direct flow rate was finally adopted. One was the successful experience of over 25 years with flow measurement in refinery applications. Each participant was familiar with the advantages of the inferential type of meter in the measurement of flow.

Then, too, the differential-pressure cell detects flow rate changes almost instantaneously and pneumatically transmits the information to the station controller almost immediately over the moderate intervening distances involved. A visual record of flow rate is also an important adjunct to motor-driven station operation. Without it, the operator has to rely on two things. He has to read the station load recorder and then check the opening of the station discharge valve to learn of an abnormal flow rate. Only by providing flow measurement can the flow rate be read directly.

Another advantage of direct flow rate is that it affords a constant check on the "C" factor of a line. This can be used as a guide in planning swab or scraper operations.

Flow override . . . Station-flow override is superimposed on the suction-discharge system as shown in Fig. 2. The output of a separate pneumatic receiver - recorder - controller enters the signol port of a 1:1 diaphragm-actuated booster relay which then becomes a selector relay. The suction-discharge controller output terminates in the supply port. The outlet port connects to the station discharge valve. Here again, whichever of the incoming two output pressures is lower commands the discharge valve.

If the suction-discharge controller output is, say, full 30 psi. and that from the flow override controller is 20 psi., the selector relay will act to reproduce the incoming signal pressure (20 psi.) at its outlet. Conversely, should the flow-override controller output be 30 psi. and that from the suction discharge be 20 psi., the relay will attempt to reproduce 30 psi. at its outlet. However, it is being supplied with only 20 psi., hence the relay is held wide open, allowing 20 psi. to pass.

As shown in Fig. 2, this selector relay output pressure to the station discharge valve feeds back to the flow override reset bellows through the balancing manifold and reset resistance so that regardless of which of the three has command—suction, discharge or flow—all three reset bellows are balanced at the station discharge valve air pressure, ready to assume command any time one of the other two measurements reaches its set point.

On West Texas Gulf the flow override controller also incorporates a separate pneumatically actuated high flow shutdown which will simultaneously sound an alarm and shut down the station should the flow accidentally reach a preset rate higher than the normal limiting set point.

To conserve space on station panels, station case pressure as well as flow are recorded on the common chart of the flow override controller.

Wortham Residual Pressure

The Wortham station on the West Texas Gulf line represents the highest potential pump capacity of any station yet designed. By pump impeller change-out, present capacity can be increased to 600,000 bbl. per day.

At Wortham is a system split—one 20-in. segment running north to the Mid-Valley Pipe Line at Longview and a 26-in. southbound segment linked to Lucas (Port Arthur area) and Nederland. These two segments are separately controlled, each employing the same system described for the other stations on the main artery.

One extra controller is installed at Wortham to operate a 16-in. control valve installed on a takeoff from the incoming 26-in. stream from Ranger,

(Continued on page 98)

JOURNAL REPORT . . .

Illinois Floods Net 11 Million Barrels of Oil During 1952

. . . or 18 per cent of state's total recovery

SINCE Illinois' first systematic water flooding began in 1942, this method of increasing oil recovery has been playing an increasingly important role there.

This method of secondary recovery produced approximately 11,000,000 bbl. of oil during 1952, or 18 per cent of the state's total recovery of 60,071,000 bbl.

Of this water-flood oil, 8,752,000 bbl. is reported in Table 1 and an additional 2,000,000 bbl. is estimated to have been recovered by "dump" flood-

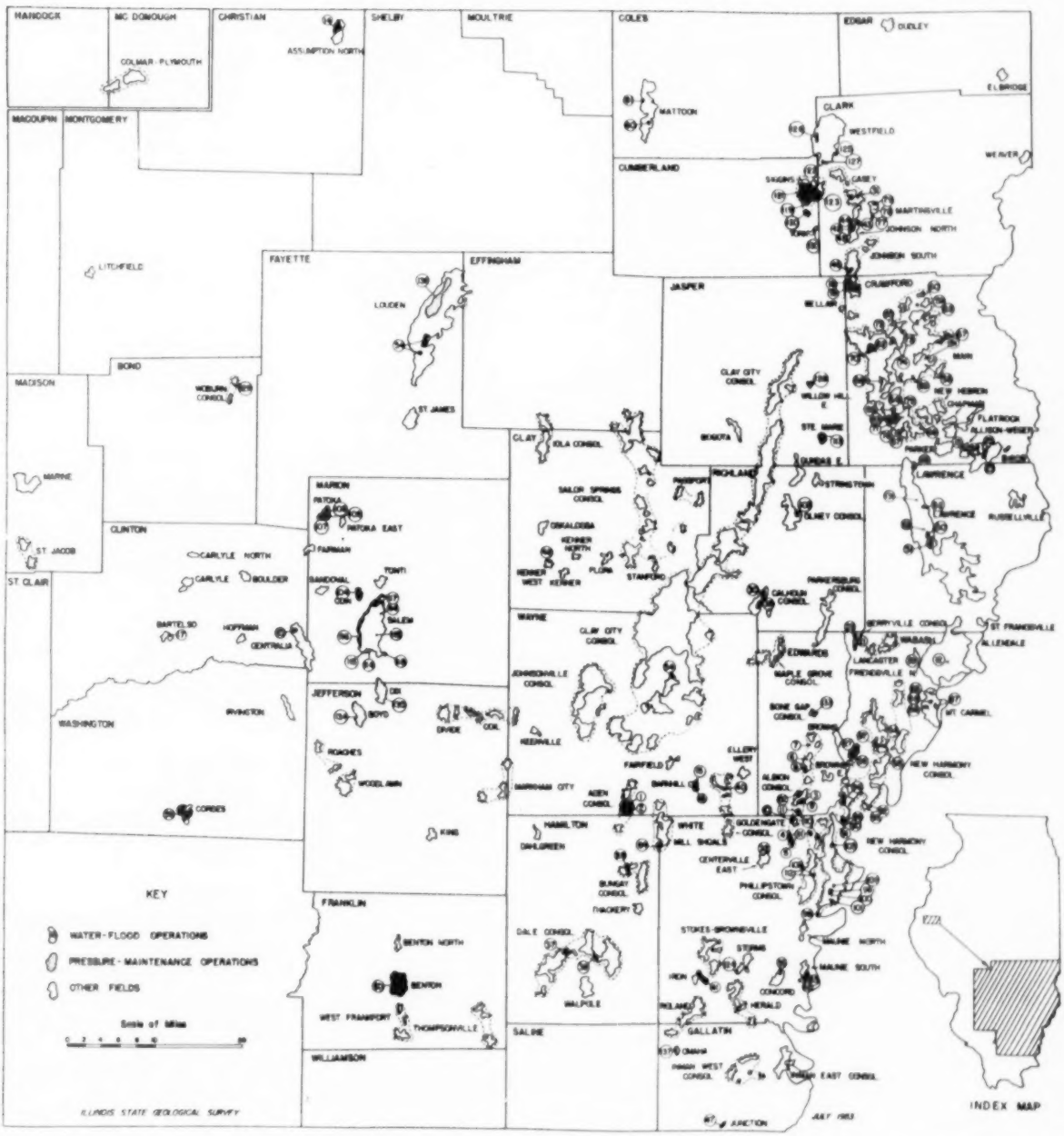


Fig. 1—The 131 controlled water floods and 6 pressure-maintenance projects using water in Illinois up to January 1, 1953, are numbered for identification in Table 1.

Table 1—Data for Controlled

Map No., county, field—operator, and formation sand—	Year first inj.	Water inj. cum., bbl. 1-1-53	Secondary recovery oil production, bbl. Total 1952	Secondary recovery oil production, bbl. Cumulative 1-1-53	No. of wells Inj.	No. of wells Prod.	Prod. acreage subj. to inj.	Depth (ft.)	Net pay thick. (ft.)	Poros-ity (%)	Per-mea-bility (md.)	Oil viscosity (cp.)
1. Wayne, Aden Consolidated—Texas, Aux Vases	1946	1,153,048	98,021	175,602	7	20	640	3,200	10	22	150	
2. Wayne, Aden Consolidated—Texas, McClosky	1946	1,133,169	35,312	141,102	6	20	520	3,350	3.6			6.5, 100°
4. White, Albion Consolidated—Concho Petroleum, Cypress	1952	104,322	None	None	8	21	250	2,850	12	18		
9. Edwards, Albion Consolidated—Superior, Bridgeport	1946	854,511		173,502	2	12	203	1,900	20	19.7	304	6.3, 95°
10. White, Albion Consolidated—Yingling, Biehl	1949	1,373,402	121,741	365,032	3	13	220	2,000	17	20.2	265	5.3, 88°
13. Crawford, Allison-Weger—Skiles, Robinson	1952	12,775	None	None	9	11	90	900	20	17	37	
14. Christian, Assumption, North—Continental, Benoist	1950	1,418,854	134,873	295,282	13	27	440	1,050	12.7	19.4	102.5	
15. Wayne, Barnhill—Ashland, McClosky	1951				7	22	320	3,350	9			
18. Crawford, Bellair—Forest, Bellair "500"	1948	8,647,293	82,871	299,528	56	51	200	550	38	17.1	143	16, 77°
19. Crawford, Bellair—Pure, Bellair "500"	1948	17,218,441	153,725	520,600	131	125	443	560	21	18.6	149	18.7, 77°
20. Franklin, Benton—Shell, Tar Springs	1949	30,092,631	2,516,773	4,268,300	107	121	2,200	2,100	35	19	65	3.5, 86°
24. Crawford, Birds—Tide Water—Robinson	1952	177,319	2,295	2,295	4	14	47	950	18	19.4	197	
25. Crawford, Birds—Yingling, Robinson	1950	1,566,681	26,918	48,372	23	24	160	960	31	19.1	135	17, 80°
26. Wabash, Browns, East—Magnolia, Cypress	1947	536,953	*66,532	*401,650	3	11	184	2,570				4.6, 90°
27. Wabash, Browns, East—Magnolia, Cypress	1951	1,175,887	*355,575	*448,874	13	20	290	2,570				
28. Hamilton, Bungay Consolidated—Texas, Aux Vases	1948	757,116	22,784	61,458	2	19	640	3,330	15.5	19.6	92	1.8, 99°
30. Richland, Calhoun Consolidated—Phillips, McClosky	1950	407,137	46,475	50,273	3	10	160	3,130	10	11.2	67.5	
31. Clark, Casey—Forest, Casey	1950	2,191,634	85,600	157,277	62	39	240	450	10	17.4	173	16.6, 70°
33. Clinton, Centralia—Sohio, Trenton	1951	216,883	*24,879	*27,945	2	12	160	3,950	22	10		2.7
34. Wayne, Clay City Consolidated—F & W Oil Co., O'Hara, Rosiclare, and McClosky	1950	250,000 est.			4	13	80	3,060	5			
36. Washington, Cordes—Shell, Benoist	1950	3,312,301	595,641	1,124,949	36	68	640	1,230	14	20	250	
37. Hamilton, Dale Consolidated—Inland, Aux Vases	1952	222,520			11	16		3,125	14.7	23.9		
38. Hamilton, Dale Consolidated—Texas, Aux Vases	1951	521,200	8,362	8,563	3	14	295	3,050	14	17	125	
40. Wayne, Golden Gate Consolidated—Cities Service, St. Genevieve lime	1952		None	None	1	16	19	3,260	14			
41. White, Iron—Shell, Hardinsburg	1950	2,410,747	178,043	161,305	19	22	390	2,500	25	17.6	152	
42. Clark, Johnson, North—McMahon, Casey	1949	3,417,233	42,292	175,941	28	26	125	450	10-30	20.8	399	10.7, 70°
45. Clark, Johnson, North—Tide Water, Casey	1950	1,330,944	11,368	32,368	15	23	65	245	17	20.6	415	10.7, 70°
46. Johnson, South—Forest, Upper Partlow	1949	8,493,156	62,000	318,210	47	56	300	490	48	16.6	319	14.7, 77°
48. Clay, Kenner, West—Phillips, Cypress	1952	299,856	None	None	4	23	35	2,600	26	18	125	
49. Lawrence, Lawrence—George & Wrather, Benoist	1952	180,310	4,977	4,977	10	14	195	1,625	18	17.2	80	5.2, 80°
50. Lawrence, Lawrence—Ohio, Bridgeport		9,760,259	735,431	1,256,226	70	155	644					
52. Lawrence, Lawrence—Ohio, Kirkwood	1952	376,988	18,211	18,211	8	18	72					
54. Fayette, Louden—Carter, Chester	1950	3,089,888	435,667	467,479	43	117	1,225	1,500	30	20	105	2.6, 79°
57. Crawford, Main—E. Constantin, Pennsylvanian sand	1952	87,348	None	None	24	21	110	850	20	21	205	
58. Crawford, Main—E. Constantin, Pennsylvanian sand	1952	315,257	None	None	15	12	70	850	30	22	130	
61. Crawford, Main—Logan Oil, Robinson	1951	139,554	2,515	2,515	6	20	20	940	22	20.5	167	7, 80°
62. Crawford, Main—Ohio, Robinson		12,419,553	445,666	973,096	156	201	949					
66. Crawford, Main—W. L. Pickens, Robinson	1951		None	None	15	12	40	850	30	19.5	125	10, 80°

ing. The 1952 water-flood recovery is 30 per cent higher than the 1951 recovery of 8,200,000 bbl., which includes an estimated 1,800,000 bbl. of dump flood oil.

Fig. 2 shows the effect of water flood (including dump flood) operations on the state's annual crude-oil production since 1936. It is interesting to note that the rate of decline in annual production has been noticeably decreased as a result of increasing secondary oil recoveries. In fact, Illinois oil production appears to be stabilized for the first time since 1936 at approximately 60,000,000 bbl. per year. It is quite possible that the increasing production of oil by water flooding will more than offset the normal decline and will slowly increase the annual rate of oil recovery over the next few years.

The cumulative water-flood recovery to January 1, 1953, was approximately 41,000,000 bbl., including an estimated 12,000,000 bbl. of dump flood oil.

Table I presents a summary of the information collected concerning water-flood projects in operation during 1952. The data are arranged alphabetically by fields and include 131 water-flood projects. Excluding the dump floods in Clay City Consolidated field, there were approximately 140 water floods in operation in Illinois during 1952. Table I provides the data on 94 per cent of these projects. In terms of cumulative figures, however, this summary approaches 100 per cent coverage for the controlled floods.

Illinois Water Floods, January 1, 1953

Map No., county, field—operator, and formation sand—	Year first inj.	Water inj. cum., bbl. 1-1-53	Secondary recovery oil production, bbl. Total 1952	Secondary recovery oil production, bbl. Cumulative 1-1-53	No. of wells Inj.	No. of wells Prod.	Prod. acreage subj. to inj.	Depth (ft.)	Net pay thick. (ft.)	Porosity (%)	Permeability (md.)	Oil viscosity (cp.)
67. Crawford, Main—Skiles, Robinson No. 4	1951	157,330	None	None	18	17	180	1,035	20	22.2	100	
68. Crawford, Main—Skiles, Robinson Nos. 1 and 2	1951	153,104	None	None	13	23	130	830	10	21.5	50	
70. Crawford, Main—Tide Water, Robinson	1952	186,363	8,971	8,971	8	15	59	910	20	19.9	278	
71. Crawford, Main—Tide Water, Robinson	1950	1,220,952	27,573	35,473	10	16	89	875	34	19.8	175	
72. Crawford, Main—Tide Water, Robinson	1948	1,513,365	54,571	212,371	25½	25	100	935	14	21	175	7, 60°
74. Crawford, Main—Tide Water, Robinson	1952	117,428	None	None	6	10	52	980	15	18.2	221	
81. Coles, Mattoon—Phillips, Rosiclare	1950	32,539	*5,573		1	5	10	1,952	10	15	990	
82. White, Maunie, South—Magnolia Tar Springs	1947	2,493,325	*38,244	*723,953	11	13	230	2,270				4.6, 89°
87. Wabash, Mount Carmel—Superior, Biehl	1949	185,853	None	None	2	10	50	1,500	7	16.6	50	
89. Wabash, New Harmony Consolidated—Luboil, Aux Vases	1951	58,543	None	None	8	10	50	2,750	12	10	20	
90. Wabash, New Harmony Consolidated—Luboil, Benoist	1951	455,300	7,900	7,900	15	17	180	2,640	14	17.1	44	
94. Wabash, New Harmony Consolidated—Skiles, Benoist	1952	91,891	None	None	6	20	60	2,520	8.5	17	57	5.1, 94°
95. Wabash, New Harmony Consolidated—Skiles, Cypress	1952	3,869	None	None	2	12	20	2,040	8	18.5	75	5.0, 90°
96. Wabash, New Harmony Consolidated—Skiles, Benoist	1951	464,683	4,750	*2,350	17	22	170	2,680	18	17	75	3.8, 81°
97. Wabash, New Harmony Consolidated—Skiles, Benoist	1950	413,942	42,991	44,288	17	26	340	2,620	12	17.2	57	
99. White, New Harmony Consolidated—Sun, Bethel	1949	1,321,513	20,013	20,992	6	10	130	2,750	23.2	18	20	
101. White, New Harmony Consolidated—Superior, Waltersburg	1946	*3,158,371	*76,673	*534,571	3	34	725	2,200	43	19.2	190	2.9, 86°
102. White, New Harmony Consolidated—Tide Water, Bethel	1951	1,030,709	54,834	55,000	17	18	160	2,700	30	16	50	2.2, 92°
104. Marion, Odin—Ashland, Cypress	1949				10	22	196	1,700	15	20	78	8.3, 69°
105. Richland, Olney Consolidated—Texas, McClosky	1951	188,312	2,807	4,144	1	17	90	3,100	5.3	13.8	522	2.6, 99°
106. Marion, Patoka—Sohio, Benoist	1943	27,848,919	148,645	5,871,103	67	64	527	1,410	27	19	110	
107. Marion, Patoka—Sohio, Rosiclare	1948	2,306,790	*132,687	*1,017,101	16	10	445	1,550	9	18.8	223	4.1
110. White, Phillipstown Consolidated—British-American, Pennsylvanian No. 7 sand	1951	*755,475	219,623	309,923	9	15	130	1,550	29	17.6	86	
113. Jasper, St. Marie—S. Lebow, McClosky	1948	*986,000	None	31,000	1	14	400	2,860	7			
114. Marion, Salem—Texas, Benoist	1950	813,142	36,477	44,222	2	967	7,975	1,770	28	17.9	150	3.9, 93°
115. Marion, Salem—Texas, Renault-Aux Vases	1950	735,664	None	None	2	616	4,881	1,825	7	16.5	18	4.8, 93°
116. Marion, Salem—Texas, McClosky	1951	3,022,740	55,153	87,623	49	589	7,711	1,950	20	15.8	700	
117. Marion, Salem—Texas, Devonian	1950	9,300,539	30,762	39,252	20	280	5,414	3,400	19	16.8	300	
119. Cumberland, Siggins—Bell Bros., Upper Siggins	1950	138,590	10,865	19,865	*9	36	80	320	10	18.9	73	12, 63°
121. Cumberland, Siggins—Forest, First Siggins	1942	27,221,365	665,000	4,535,736	407	329	1,800	400	32	17.5	56	8, 60°
122. Clark and Cumberland, Siggins—Hammonds & Wheless, Casey	1951	276,764	562	562	27	20	135	447	56	21.5	40.2	10.5, 69°
123. Clark and Cumberland, Siggins—Pure, First and Second Siggins	1946	8,170,591	235,434	1,638,338	127	121	468	404	25	18.5	45	8.8, 68°
126. Coles, Westfield—E. Constantin, "Gas sand"	1951	288,868	None	None	24	11	70			21.5	86	
127. Clark, Westfield—Forest, Pennsylvanian "gas sand"	1950	365,234	7,000	10,186	9	12	20	270	25	17.9	153	54, 60°
Total for 55 projects not listed and having fewer than 10 producing wells		9,952,205	549,953	1,018,345	196	284	2,753					
Grand total, 131 projects		221,078,168	8,751,598	28,332,216	2,131	5,140	31,330					

*Includes primary production.

TABLE 2—ILLINOIS PRESSURE-MAINTENANCE PROJECTS USING WATER INJECTION

Map No., county, field—operator, and formation sand—	Year first inj.	Water inj. cum., bbl. 1-1-53	Secondary recovery oil production, bbl. Total 1952	Secondary recovery oil production, bbl. Cumulative 1-1-53	No. of wells Inj.	No. of wells Prod.	Prod. acreage subj. to inj.	Depth (ft.)	Net pay thick. (ft.)	Porosity (%)	Permeability (md.)	Oil viscosity (cp.)
132. Edwards, Albion Consolidated—Calvert, Biehl	1951	60,612	108,321	250,471	2	7	60	2,080	9.2	16.8	384	10.4, 85*
133. Edwards, Bone Gap Consolidated—Gallagher, Waltersburg	1952	39,000	104,026	107,641	1	11	40	2,310	20	18	120	5.6, 85°
134. Jefferson, Boyd—Superior, Bethel	1945	5,268,103	417,927	6,173,784	3	60	750	2,065	19	17.5	175	
135. Jefferson, Dix—Carter, Bethel	1948	1,647,620	299,772	6,489,026	4	64	1,200	1,950	12	16.4	128	2.5, 87°
136. Fayette, Loudon—Carter, Devonian	1943	75,497,045	657,266	13,783,028	6	69	2,600	3,100				6.5, 96°
137. Gallatin, Omaha—Carter, Palestine	1944	671,067	97,572	1,547,103	1	15	260	1,700	17	18.9	427	17, 76°
Total		83,183,447	1,684,884	28,351,053	17	226	4,910					

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Mr. H. W. Cardwell
Cardwell Manufacturing Co., Inc.
Wichita, Kansas

Dear Mr. Cardwell:

We feel that the performance of our two Cardwell model "D" drawworks has been such as to call for a word of praise from us. We have had one rig for fourteen months and the other for ten months. During this time both rigs have been in continuous use and have given excellent service.

Until a few weeks ago, both of these rigs have been on deep workover jobs in South Louisiana, on depths ranging from 8,000 feet to 13,000 feet. Most of the wells have been old ones which had very old tubing in them, this meant that we had to make many round trips during fishing operations. In most cases we then picked up 2 - 7/8" drill pipe to complete the workover job. We feel that this type of operation has given these rigs a real test.

Several weeks ago, we put one model "D" to drilling, and so far this has been our lucky rig. On it's first drilling location, it brought in a nice oil well for Humble Oil and Refining Company in South Louisiana, at 5,200'. On its second try, it made a good oil well for Sunnyland in South Mississippi. This well was drilled to 6,500' using 3 - 1/2" drill pipe. At this depth, we found the rig fast at coming off of bottom and on the basis of its performance, I will not hesitate to put it on a drilling job to 8,500 feet.

My men particularly like the ease of operation of the air-friction clutches and the ability which these clutches give them to change speeds with the load moving. I think that the combination of the water-circulating brakes and the Hydrotarder give us the best braking system that anyone could ask for and I know from personal experience that these brakes have excellent feed-off characteristics. We appreciate the feature of the Hydrotarder being within the eight foot road width so that we do not have to take it off for highway moves.

When I have occasion to need more drilling or workover equipment, you may certainly expect to hear from me.

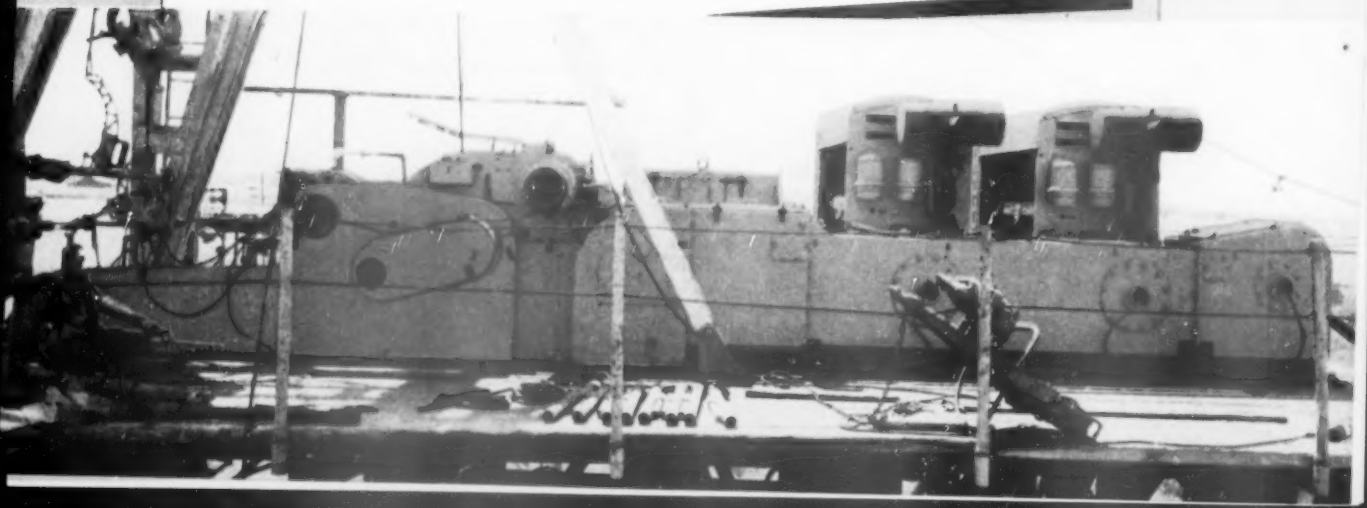
Very truly yours,

SUNNYLAND CONTRACTING CO., INC.

J. E. Treadway

J. E. TREADWAY

JET:rl



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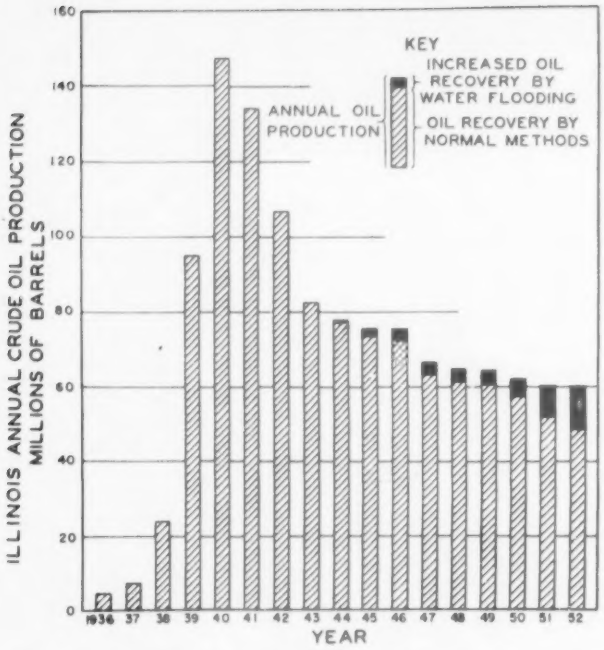


Fig. 2—Annual crude-oil production in Illinois showing oil recoveries obtained by normal operating methods and increased recovery by water flooding.

A total of 72,951,000 bbl. of water was injected during 1952 in recovering 8,752,000 bbl. of water-flood oil, or a ratio of 8.3 bbl. of water for each barrel of oil. A cumulative total of 221,078,000 bbl. of water had been injected by the end of 1952 in recovering 28,332,000 bbl. of oil, or an input water-oil ratio of 7.8. The cumulative input water-oil ratio is lower than the 1952 ratio because a considerable number of new projects were started in 1951 and 1952 from which appreciable increases in oil production had not been realized by the end of the year.

The increasing development of water-flood projects in recent years is very evident. For example, the number of projects has more than doubled in the past 2 years, from 59 projects at the end of 1950 to 131 projects at the end of 1952. As listed in Table 1 these 131 projects had developed 31,330 acres for water flooding, or 8 per cent of the state's total oil-productive acreage.

Table 2 presents data on the six pressure-maintenance operations that used water injection during 1952. The oil-production statistics include both primary recovery and any additional oil obtained by pressure maintenance operations.

Each project listed in Tables 1 and 2 has been numbered, and corresponding numbers on Fig. 1 show the location of water flood and pressure maintenance operations in Illinois during 1952.

Acknowledgment

Information on which this report is based is by courtesy of the Interstate Oil Compact Commission and is from the Illinois State Geological Survey Circular No. 185 entitled "Summary of Water-Flood Operations in Illinois During 1952," by Paul A. Witherspoon and members of the Illinois Secondary Recovery and Pressure Maintenance Study Committee.

Oriented Punch-Core Drilling

(Continued from page 74)

oriented punch-core drilling equipment in 1933. This same equipment has been used by Stanvac geological field parties ever since.

Oriented punch-core methods start with the drilling of a hole through surface soil with a 3½-in. ship's auger. The auger is turned down through the soil and "weathered" zone by hand and lengths of light pipe added as the hole deepens, until the "fresh" rock formation is encoutnered. Such auger holes may go as deep as 25 ft.

Once solid rock is reached, a coring assembly is lowered into the hole for the purpose of cutting the required rock sample. First goes the hollow core cutter and core barrel which punch out and hold the sample. This is connected to a "jar" or hammering mechanism which drives the core cutter into the rock. The jar consists of a hollow case in which a plunger is worked up and down from the surface, making 22-in. strokes against the cutting tool. Sufficient light drill pipe is added to enable geological party to work the plunger.

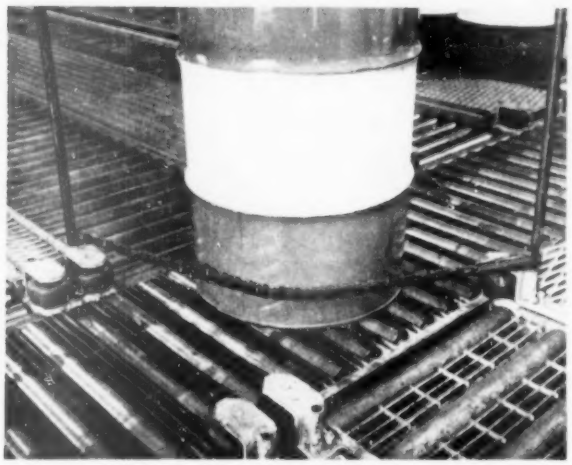
The entire assemblage is oriented to compass north by an orienting board which sits astride the hole on the surface. Drill pipe, jar, and core cutter are all assembled so that no deviation is possible from the correct orientation. A tiny knife welded to the inner wall of the core cutter creases the side of the core sample as it is cut, indicating compass north on the sample. When the cutter has been jarred 6 or 8 in. into the formation, it is shaken loose and the assembly is lifted out of the hole. The core sample of underground strata is carefully removed. For future identification, arrows pointing to the bottom end of the sample are added along the orientation groove and top and bottom are carefully marked.

Core Examination

The geologist dries the core, breaks it along its natural bedding planes, and places the core in a coremeter. This simple measuring device enables him to record the direction and angle of the planes along which the subsurface rocks lie. When this information from one core is entered on a map and correlated with similar data from other cores, taken at 150 to 300-ft. intervals on the ground, the oil hunter can map the characteristics of potential oil-bearing strata over any given area. In addition, later laboratory tests of the core material may yield paleontological data.

A seven-man crew, operating one oriented punch-core assembly, can take from 25 to 35 cores per day. In actual practice, up to 60 cores per day can be taken by a 90-man party, equipped to live in the jungle and to make their own trails as they go. This party includes trail-cutting crews, surveyors, auger and coring parties, and cooks.

In recent years, other innovations have appeared which have replaced the original oriented punch-core equipment in some areas of operation. Among these are portable drilling rigs, light enough to be carried or flown in by light plane or helicopter. When it is possible to operate such equipment, it can penetrate subsurface strata sufficiently to give the geologist better information as to the depth of the strata and the composition of the rock layers.



Chain directs conveyor traffic

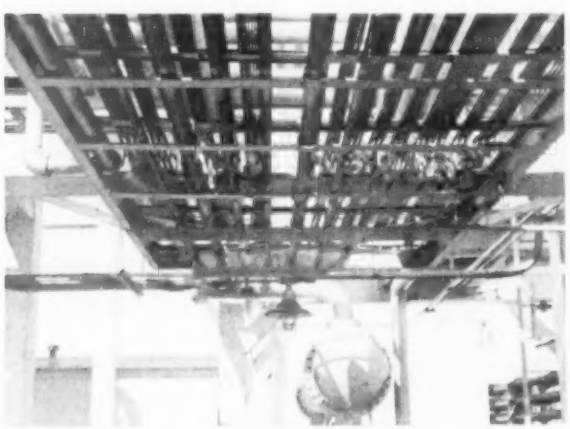
A SIMPLE but ingenious device for deflecting drums at conveyor transfer points gives Esso Standard Oil Co., of Bayonne, N. J., 12 different routing possibilities at each intersection of its 144-line drum-handling system.

The device, one of several time and labor saving innovations in this completely conveyorized 3,000-filled-drum-capacity storage system, is merely a section of roller chain secured at each end to a rod.

By inserting the rods in holes provided at conveyor corners, the chain is stretched across the conveyor to deflect drums as desired. A spring at one end of the chain absorbs deflecting shocks.

Thus, 55-gal. drums of oil coming from any one of four directions on these reversible conveyor lines can be routed, by a simple repositioning of the rods, to any one of three other directions—a total of 12 routing possibilities at each conveyor intersection.

The entire Esso drum-handling system—which can remove any drum from storage, regardless of where it is located, in 90 seconds—was engineered and installed by Lamson Corp., Syracuse, N. Y.

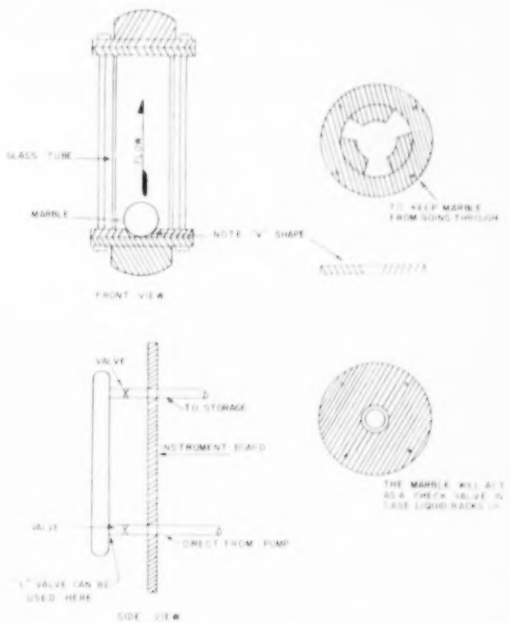


Tags help trouble shooting

AT Midland Cooperative refinery, Cushing, Okla., all instrument tubing is tagged with numbers to help in tracing trouble and in maintenance.

Air winch is portable, sittable

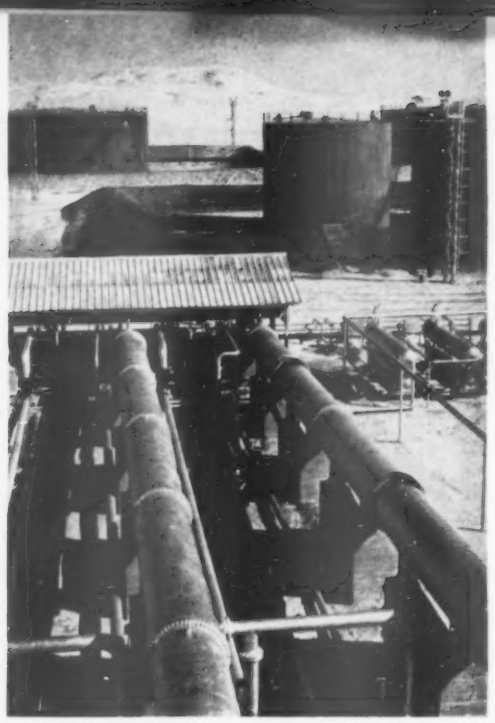
SAFETY engineer at Carter Oil Co.'s Billings, Mont., refinery demonstrates portable air winch, which can be pulled easily by one man. A brake is provided so that the unit will not roll. A seat is provided for the operator.



Marbles aid in color specs

A LIQUID gage viewer conceived by Albert Slehofer, of Carter Oil Co., Billings, Mont., consists of a rotameter-type installation with colored balls or marbles replacing the usual float. The ball should be the same color as that of the desired product which is to be flowing through the viewer. Thus, the operator can tell at glance whether he is making product of specification color.

RIG MOVING A CINCH . . . Rig being skidded across the desert by mounting the entire drilling unit on four carriers which travel on Caterpillar tracks.



TILTED SEPARATORS . . . Separators in foreground are part of a seven-stage process in which tilting at 1 in. in 24 affords added throughput.

Kuwait—Where There Are No Dusters

. . . and where producing conditions approach the ideal, with no necessity for mechanical lifting

Kuwait's 20 Years of Operation . . .

1934 Concession covering State of Kuwait granted by the ruler to Kuwait Oil Co., Ltd. (K.O.C.), owned equally by Anglo-Iranian Oil Co., Ltd., and Gulf Oil Corp.

1936 (May) Drilling of first test well began at Bahra; abandoned following April at 7,590 ft.

1937 (October) Second test well at Burgan proved successful.

1939-1945 Operations curtailed because of World War II; resumed in October 1945.

1946 (June) First shipment of Kuwait crude, and beginning of large-scale development of Burgan field, as shown by these production figures:

1946—	5,928,000 bbl.	1950—	125,722,000 bbl.
1947—	16,228,000 bbl.	1951—	204,909,000 bbl.
1948—	46,547,000 bbl.	1952—	273,432,000 bbl.
1949—	89,930,000 bbl.		

1951 Original Magwa discovery completed late during the year, some 8 miles north of northern end of Burgan.

1953 New production found on Ahmadi Ridge, 6 miles northeast of outer limits of Burgan field, and 7 miles southeast of new Magwa area.

1953 (February) Magwa brought into commercial production, following commissioning of No. 9 Gathering Center.

1953 Number of wells completed at end of August—153. Number of wells drilling at end of August—three (one at Magwa and two at Ahmadi Ridge).

Two submarine berths now in commission at Mina al Ahmadi. The new asphalt plant is accounting for 15 long tons daily.

THE greater part of Kuwait territory consists of residual gravel and windblown desert sand lying on calcareous sandstones of Pliocene age. Exposures of the latter formations occur to the southwest and north of the territory, while outcrops of slightly older Miocene sandstones are found on the northern shores of the Kuwait Bay, and in the Burgan area, approximately 28 miles to the south of Kuwait town.

First well . . . Bahra 1, drilled in 1936-37 on geological evidence on the northern shore of Kuwait Bay, proved unsuccessful. The discovery well, Burgan 1, was located a year later following detailed geophysical work. It struck crude oil of 31.5° A.P.I. gravity in a Cretaceous sand at 3,672 ft. Drilling of eight more wells between 1938 and 1942 formed the basis of De Golyer's high figures for proved and indicated reserves in 1944.

Burgan has no surface expression, but there is a big asphalt seepage, and the shallow Eocene limestones are impregnated with large amounts of native sulfur. There is some faulting, but not enough to affect the pool. The Burgan field covers an area of 135 sq. miles.

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Export bulk liquid traffic is big business at Corpus Christi. Outward bound tankers carried 1,124,950 tons of all types of bulk liquids in 1952—making Corpus Christi one of the nation's key bulk liquid distribution centers.

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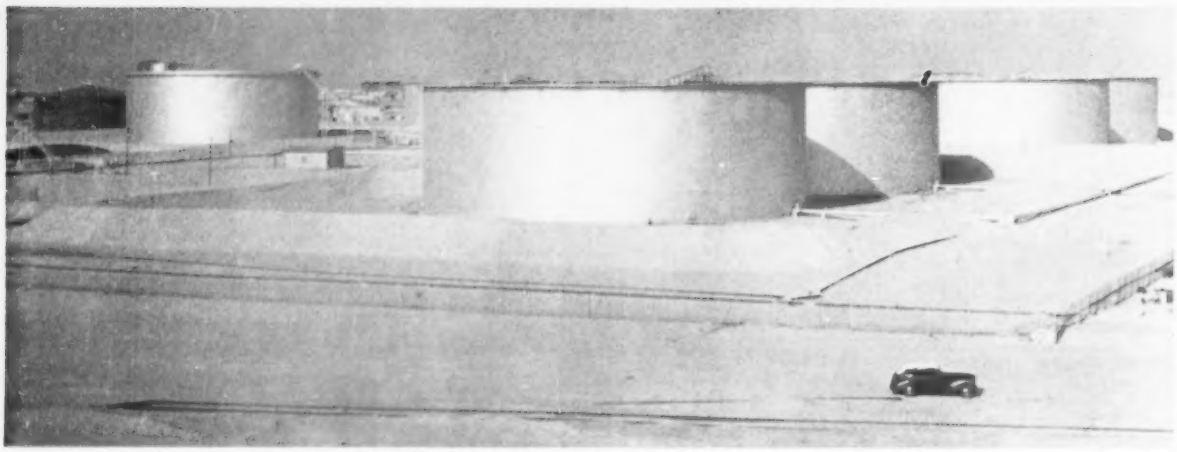


GRAVITY DISCHARGE . . . From this central tank farm at Ahmadi, Kuwait crude moves by gravity to loading facilities on nearby coast.

The structure is an elongated dome, with a major N-S axis 12-15 miles in length, and a minor E-W axis, 8-10 miles long.

Local reservoir rocks are thick sandstones of Middle Cretaceous age, and thin Orbitolina limestone. The strong development of sandstones at Kuwait makes a striking contrast to the oil fields of Iran, Iraq, and elsewhere in the Persian Gulf, in all of which the reservoir rocks are limestones. The oil is of asphaltic type containing 2 to 2.5 per cent sulfur. Depths to producing horizons are relatively shallow, with no well in this field exceeding 5,000 ft.

Producing section . . . This is made up of four major sand formations, separated from one another by shaly intervals. The oil field, as a whole, is subdivided into two major reservoirs by an intervening bed of limestone which is generally oil stained, but not productive. The entire producing series is underlain by salt bottom water; the oil-water contact is virtually horizontal, and cuts across each individual producing sand. The sand thicknesses differ slightly from well to well, and the amounts of underproductive limestone and shales vary between rather wide limits.

An extension 8 miles north of Burgan was located in 1952, and another at Ahmadi, to the east, in early 1953. These brought the total number of Kuwait producers at the end of 1952 to 131 with only 1 initial dry hole. The Magwa 1 wildcat drilled in 1951, was completed early the following year as a producer. This was followed by a step-out drilling program, and at the end of 1952 the Magwa area had eight completions. The second new field wildcat was spudded in August 1952 on the Ahmadi Ridge structure just south of the company's camp and tank farm. This well, Ahmadi-1, attained a final depth of 5,349 ft. late in October 1952 and was later completed as a satisfactory potential producer. This successful exploratory test continues the Kuwait drilling record of no dry holes since the first well drilled in Burgan field.

The company's three drilling rigs, active throughout 1952, drilled 101,020 ft., completed 2 new field wildcat wells, 7 extension wells, and 12 development wells. A fourth rig worked part of the year on well-service jobs. The Magwa area was brought into commercial production in February 1953, following completion of gathering lines and the separator plant. Its separator facilities are tied into the Ahmadi tank farm.

Favorable Factors

The large size of individual fields in the Middle East stems from an exceptionally favorable conjunction of all the factors controlling oil accumulations, namely, initial richness of source rocks, good reservoir rock conditions, large anticlines with extensive drainage areas, and good coverage rocks to prevent the escape of oil to the surface. Of these, the first is probably the most important. The result is the occurrence of a number of giant fields with reserves on such a colossal scale as to exceed by a substantial margin the proved and possible reserves of the entire North American continent.

In addition to the enormous size of individual oil fields, the excellence of the reservoir formations allows very high rates of production with consequent economy in engineering effort. Offsetting these operating advantages, however, there are substantial handicaps imposed by the remote geographical location of the region in relation to consuming centers, climatic extremes, scarcity of indigenous skilled labor, and the high sulfur content of the crude. Some of these difficulties are gradually being overcome, in varying degree, but others remain.

Conditions for crude-oil production are almost ideal in Kuwait. The production problem has been simplified inasmuch as the technicians have had only to deal with sand-free flowing production. There is no question of having to lift the crude mechanically, nor will there be for many years to come. Other obstacles met with in certain other oil-producing areas of the world are also absent in Kuwait. There is no b.s. and w. in the oil, and therefore no surface treatment is required to clean the crude of salt and water. Again, the oil being of an intermediate base there are no paraffin troubles which would cause the plugging of tubing and pipe lines. Lastly, well-head pressures are not so high as to render drilling hazardous, but, on the other hand, are high enough to insure a long flowing life for the wells. The well-head flowing pressure on the upstream side of the bean or choke varies between 550 and 650 psi.

In 1946 the technical planning of this major petroleum project did not present any great difficulties. However, the entire absence of local resources, made it imperative to plan not only for oil development, but also for every requirement of modern life.

The distillation plant, in operation for nearly 4 years, provides 700,000 imperial gallons of potable water a day to company workers. A 1,000-mile "air-lift" for fresh vegetables has been established to Syria and the Lebanon. Costly though this method is, it reduces wastage to the minimum and gives an easily controlled and regular supply, and reduces the refrigeration space required. Permanent housing largely followed the conventional practice of importing brick and locally

made concrete blocks, excepting the Situfoam technique used for sheltering labor.

Turning to development of oil production, transport, storage, and shipment, the plan followed was largely conventional. This program was planned so that temporary facilities could be incorporated quickly, and could run as part of the final scheme, or be replaced later as experience dictated.

Thus, the temporary oil-gathering center made use of small vertical separators readily available in the United States, pending the arrival of permanent horizontal separators specifically designed for the job; and also to the oil pumps for pumping the crude from the gathering centers to the main tanks. Small-size sea-loading lines were, in due course, replaced by the larger oil dock.

Virtually the entire drilling program in Burgan was carried out using National 50 rigs. As many as 12 of these were in employment in 1949, when drilling activity was at its peak. Once the well potential became sufficiently large to satisfy the capacity of the available gathering centers, two National 50 rigs, working a greatly improved efficiencies, were able to complete wells at a rate sufficient to keep pace with additions to separator and other oil-handling facilities. The nature of Kuwait's desert terrain renders it feasible to skid the derrick and draw works, as well as the engine and substructures with other components from one site to another by employing up to 10, or even 12, D8 caterpillar tractors.

The normal casing program adopted is as follows: 16-in. 75-lb. welded casing is set in 20-in. surface hole at around 300 ft.; 10¾-in. 45-lb. casing in 12¾-in. hole at approximately 3,250 ft., and a 7-in. 23-lb. oil string through the pay zones at nearly 4,750 ft. The 7-in. string is fitted with centralizers and scratchers, and is reciprocated while being cemented.

Electric logs and caliper surveys are made before running the 10¾-in. and 7-in. casing strings, and temperature surveys were carried out to assess the value of the cement jobs. Where lost-circulation zones prevent cement returns to the surface, extra cement is batched down the annular space until the temperature surveys show that the job is satisfactory. The 10¾-in. casing seat is pressure tested on drilling out.

Below 300 ft. the intermediary hole can lose mud in any quantity at any point down the casing seat at approximately 3,250 ft. No correlation of lost-circulation zones from well to well have been possible, and the major zones appear to lie between 600 and 800 ft. in the Eocene limestone, and 3,000 and 3,200 ft. in Upper Cretaceous. The lower part of this latter formation is dense in structure, and the policy is to set the intermediary string in it, with a reasonable certainty that the major trouble will be safely cemented off behind it.

Considerable sections of Eocene and Cretaceous limestones are cavernous in nature and water logged, calling for a fine balance being maintained between the mud weight and the formation pressure, to prevent total loss of circulation on the one hand, and strong water flows on the other.

In late 1951 the technique employed in drilling the intermediary hole was changed with satisfactory results. The use of mud in this section has been abandoned, and, instead, the maximum quantity of water up to the full capacity of the well pumps was used when zones of total, or partial loss of returns were encountered. Drilling was continued, and it was rarely that the cuttings did not seal off the porous zones comparatively quickly. If they did not there was no alternative but to place a cement plug. A flow of sulfurous water was sometimes encountered, and this normally helped the situation; but, care had to be taken that the H_2S, present in this flow was effectively dispersed.

Speeding Up Drilling

After setting the 10¾-in. intermediary string of casing, the use of water was continued to within 150 ft. of the first sand from which point drilling continued, using an oil-emulsion, phosphate-base mud weighing approximately 11.2 lb. per U. S. gallon and with a water loss not greater than 5 ml. These practices have contributed greatly to the speeding up of drilling operations, and coupled with the elimination of the use of mud over a long section of the hole, have resulted in lower costs. For example, in early 1948 the cost of mud and chemicals for each well was around $20,000; in 1949, $12,000; in 1950, $6,000, and now it is half this last figure. These measures have led to a marked improvement in completion times of Burgen development wells.

The practice hitherto had been to complete wells as dual producers with production from the lower zone obtained through tubing, and from the upper through the casing in which a suitable packer has been set to isolate the two sands. Wells in the center of Burgan field are completed in the third and fourth sands, and those on the flanks in the first and third.

To prevent water from coming in, and to allow a reasonable water-free flowing life of the well, an interval of at least 100 ft. is left unperforated above the oil-water level, excepting where a shale break intervenes, in which case this interval is reduced to 75 ft.; and where shale breaks occur within the producing sand, 10-ft. or longer intervals remain unperforated for future packer-setting points and water control.

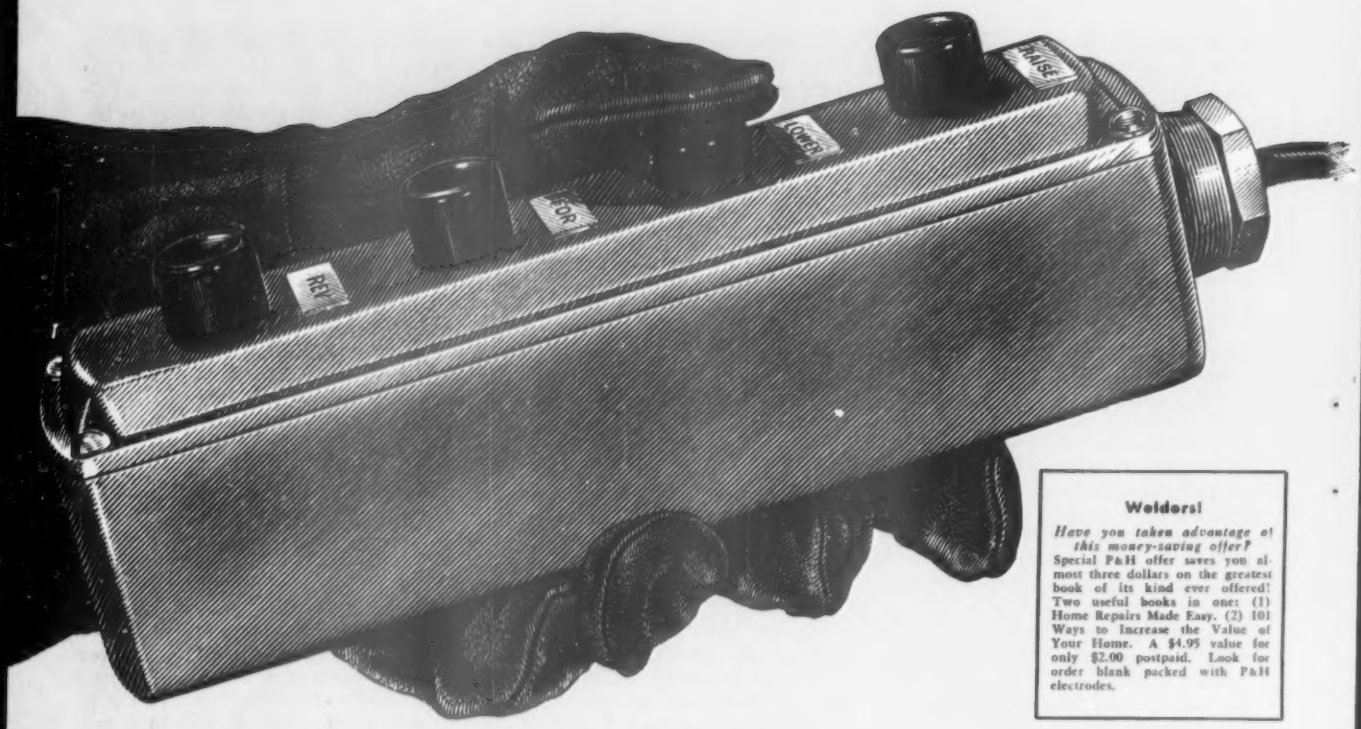
Until recently, it was the practice to perforate the oil string with a Schlumberger 100-mm. gun using 8.5-mm. bullets at six shots per foot. This degree of perforation called for between 2,000 and 2,400 bullets per well. To save time, two guns are made up in assemblies 24 ft. in length and run, and reloaded alternately. On completion of the perforating operation, a rock bit, with cutaway water courses, is run, the perforations scraped, and circulation reversed to recover any bullets which may have failed to penetrate the casing.

Shaped charges have been used recently, and it would appear that as good, and more consistent, results are obtained with four shaped charges per foot compared with bullet perforations at a density of six per foot. The use of shaped charges has resulted in a saving in perforating costs of approximately 10 per cent.

After perforating and scraping, the dual-producing wells are completed by running a Lane-Wells circulating packer on 3½-in. o.d. tubing with a Gray type 4,000-psi. well-head christmas tree with Cameron wings on the casing zone. Wells are brought into production by washing, and the packer is set and tested in the unperforated interval between the two selected zones.

Burgan field was originally drilled on a 600-acre hexagonal grid. One well out of three on predetermined sites was cored through the producing formation, and considerable core information is thus available for use in the correlation of the 200-acre spacing infill well drilled subsequently. Coring was done by conventional methods and, in these relatively unconsolidated sands over-all recovery was of the order of 50 per cent. More recently, a diamond-core barrel was used, and an over-all recovery of 73 per cent achieved. Although the initial cost of the diamond head is considerably in excess of that of the conventional type, there would appear to be an over-all saving in the use of the former on account of the much greater footage obtained. A comprehensive core laboratory is available to permit complete examination of the cores. Analysis of vertical and horizontal permeability, porosity, and oil and water saturation is made of each foot of core recovered.

Although individual production capacities vary, the average first and third sand well is reckoned to produce



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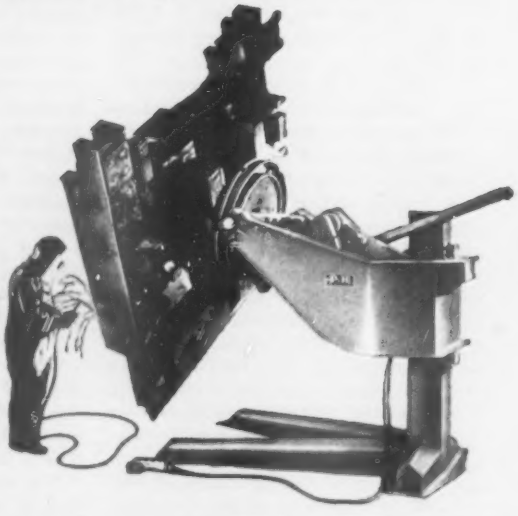

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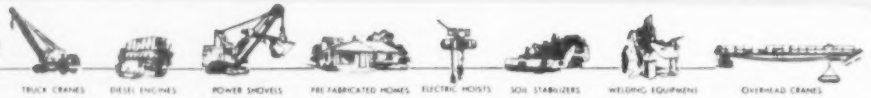

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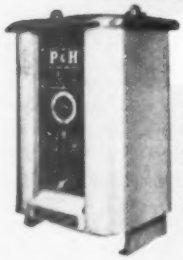

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approximately 5,000 bbl. per day, while a third and fourth sand dual producer, around 9,000 bbl. per day. Individual wells and pay zones are periodically tested for gas-oil ratios. Productivity-index measurements, as well as bottom-hole-pressure surveys, are routine. There is a considerable margin between present bottom-hole pressures and crude saturation pressure, which, together with the rate of bottom-hole-pressure decline, promises a long period ahead free of gas troubles. In this case, the water drive would appear to be efficient.

Design of Gathering System

In brief, the crude flows from individual wells through flow lines to centrally located gathering centers, or gas and oil separating stations. After separation, the oil is pumped to a main tank farm located nearly 15 to 20 miles from the field. The tank farm is erected on a rise of some 400 ft. above sea level, thus enabling the crude to flow by gravity to the seaport of Mina al-Ahmadi where it is loaded into tankers.

The gathering centers separate the oil and gas so as to yield a stable crude rich in the lighter hydrocarbons. These were originally dimensioned for a throughput of 100,000 bbl. per day, but, with minor modifications the capacity of each has been stepped up to 120,000 bbl. per day.

Profiting by experience gained in Iran, K.O.C. installed horizontal separators at an inclination of 1 ft. in 30 ft. The separators are large cylindrical vessels, built in flanged sections 25 ft. long, 4 ft. 6 in. in diameter and a total length of 145 ft., with the crude-oil inlet in the center, the gas outlet at the raised extremity, and the separated crude outlet at the lower end.

Following upon exhaustive tests on existing separating stations it was found that by adding a 25-ft. length to the first-stage separators, and by increasing the inclination of these from 1 in 30 to 1 in 24, the Kuwait field engineers were able, at a relatively small cost, to increase the capacity of the centers by 15 to 20 per cent.

An installation of this type, including pumps and tanks, costs more than £500,000. Initial pressure of the crude is let down in six stages from 425 psi. to 200, 100, 50, 25, and 10 psi., respectively. The crude at 10 psi. is pumped by centrifugal transfer pumps to storage tanks at substantially atmospheric pressure. The storage tanks are, therefore, considered the seventh stage of separation.

This multistage separation technique results in a greater volume of stable liquid recovered from a given quantity of crude admitted to the separators. In addition, the separated crude oil has an improved gravity. From actual test carried out in the field it has been proved that a seven-stage unit will yield approximately 1.6 per cent additional liquid compared with three stages of separation, and this is equivalent to 1,600 bbl. per day on a 100,000-bbl. per day installation. The improvement in gravity as between seven and three stages is of the order of 0.5° A.P.I.

Unless under test, all wells flow through a common manifold. Production is allotted to individual wells on the basis of charts on orifice meters mounted on each flow line just before the gathering center. These meters measure the combined gas and oil production of individual wells. Adjustable flow beans are installed upstream for the meters. The flow from each well can thus be controlled by the operator in charge of the gathering center. Rates of flow of individual wells can be altered, or the flow entirely shut off if and when required.

The oil collected in the main storage tanks at the gathering centers is pumped along two 20-in. lines to the main tank farm. In each transit pump station there are three gas-engine-driven pumps of the centrifugal type each with a capacity of 40,000 bbl. per day at 750 psi.

Floating-roof tanks of the Wiggins type were selected for the Ahmadi tank farm. The amount of tankage required was arrived at, after weighing such factors as (1) the rate at which tankers can be loaded; (2) the weather, which frequently interferes with the berthing of tankers from periods of up to 4 days; (3) the time it takes to shut wells in and, more particularly, to bring them back on to full production again; (4) the inevitable bunching of tankers, and (5) the absence of a trunk line permitting regular disposal of production from the field. After carefully considering all these factors, approximately 3-million-barrel storage was erected. Allowing for a minimum stock K.O.C. must always carry, this provides empty storage for about 4 days' production, which is reckoned a minimum safe figure. Individual tanks are of 168,000-bbl. capacity. Automatic equipment has been installed in a control room where, by the pressing of buttons, electrically operated valves, on both the inlet and outlet lines, can be actuated.

A set of large-diameter gravity lines conveys the oil to Mina al-Ahmadi, and five tankers can be loaded direct from Ahmadi. A switchgate manifold, with electrically controlled valves installed on the landward side of the jetty, enables any tank to be connected through any of the gravity lines to any of the loading berths.

General view of refinery and light-products tankage at Petitjean, where a new catalytic cracking unit has been contracted for.

OUTLOOK IS OPTIMISTIC

French Morocco Looks Toward Self-Sufficiency

Eleven rigs are active in a stepped-up search for new oil deposits

by Maurice Moyal

COMPARED to the oil production in the United States, French Morocco's paltry 101,027 tons (about 2,080 bbl. daily) seems a mere drop in the bucket. But as the Societe Cherifienne des Petroles (known as S.C.P.) which holds here a 5.5-million-acre concession, is now making a concerted drive to add to the country's oil resources, it may well be able to supply in the near future all domestic needs, leaving some crude available for export to France.

The outlook is optimistic. In 1952, two new fields, Upper Sidi Fili and Bled Eddoum, were brought into production, raising output by some 33 per cent, despite the lowered production of older and partially depleted fields. Total production is steadily on the upgrade. In barrels per day the production figures work out as follows:

1939	100
1950	786
1951	1,512
1952	2,000

Even before the establishment of the French protectorate in 1912, Morocco was favorably regarded for its oil prospects. The northwest region is the most promising area, and especially, the western part of a deep sedimentary basin, situated between the primary Rif Mountains and the northern edges of the Hercynian Atlas Mountains.

This basin is divided into three superimposed geological units.

1. A secondary basin, stretching along the edges of the Middle-Atlas Mountains and the Hercynian Meset Range, whose only outcrops are the rows of parallel hills, known as the Rides Prerifaines. Tests have proved that this basin also underlies the more recent and discordant masses of the Rharb plain, along the Atlantic seaboard.

2. A complex unit, called the Nappe Prerifaine, is a very large overthrust, covering with its considerable salt masses the older sediments of the secondary pit.

3. A Miocene basin which is the last vestige of the South Rifan channel.

In all three zones, exploratory work has located the presence of limestone horizons, favorable for oil accumulation, and where actual oil shows were found. After thorough geological and geophysical studies, exploratory wells have uncovered the presence of gas and shows of oil in the Miocene basin, where the dominantly marly structures lend themselves to easy drilling

But whether production is commercial depends on the presence of such stratigraphic traps as lenses and faults in the sand or sandstone horizons. EM I opened up a natural-gas deposit, estimated at some 300,000,000 cu. ft. BA I opened up another gas deposit estimated at 140,000,000 cu. ft. into the Dogger sandstone. In an effort to determine whether the gas was present in commercial volume, further wells were sunk in the vicinity of BA I, uncovering the lack of continuity in the gas-bearing Vidobonian horizons.

The discovery well on S.C.P.'s holdings was completed in 1934 in the Rides Prerifaines in the Tselfat hills. At first, the well flowed at the initial rate of 200 tons per day. But it did not live up to such expectations. Subsequently, smaller deposits at Bou-Draa, also in the Rides Prerifaines, and those at outlying Bou-Hamra, in the Rharb plain, also were brought into production. In 1952, the three older fields yielded together only 1,296 tons and are thus to be abandoned.

More sizable production dates from 1947, with the discovery of Baton field, to be followed in 1949, 1950, and 1951 by Mellah, Tisserand, Lower Sidi Fili, and Mers el Kharez fields. All these fields are located in the primitive substratum of Oued Beth Valley, about two-thirds the way between Rabat and Meknes.

It is noteworthy that all fields are on the edges of the primary structures, bordering the secondary basin. Here, the contact of the Mesozoic formations with the Paleozoic ones is roughly along the SW-NE and NE directions. The five fields stretch along a broken line at the bottom of the SW-NE fault, which essentially makes up the middle valley of the Oued Beth.

Typical of all five is Baton field, at a depth of 3,200 ft., with an area of some 150 acres and a thickness of some

125 ft. Baton has begun to make water since 1951 and its control poses a problem. Its reserves add up to a few hundred thousand tons. The reserves of Tisserand and Mellah seem even less important. The largest field is Lower Sidi Fili, which flowed 48,654 tons (about 1,000 bbl. daily) in 1952.

As 1952 opened, the big question was whether the productive area was localized in the Oued Beth's primitive structures, or stretched into the secondary basin itself. The discovery of Upper sidi Fili and Bled Eddoum fields answered this question.

Thus, the main drilling effort has since been concentrated on the most favorable territory of this secondary basin, and, more particularly, along a crescent-shaped strip, with its outside to the southwest, stretching all the way from Petitjean, seat of S.C.P.'s field headquarters, to Meknes.

In the northern part of this strip, OR 3, 4 km. to the north of OR 4, proved a dry hole at 13,500 ft. but it helped establish the boundaries of the secondary basin and to amplify previous stratigraphic studies and seismic reconnaissance.

Southerly Extension

In February 1952, SF 20 uncovered at Sidi Fili the presence of new deposits in the secondary basin, bringing the area of the productive zone from 222 to 275 acres and extending it in a southerly direction.

In May 1952, DM 4 found Upper Bled Eddoum field, northeast of Upper Sidi Fili and in the same Middle and Lower Liassic horizons, thus most probably extending it. In November 1952, DM 13 uncovered the Lower Bled Eddoum deposits, in the same Paleozoic formations as the other Oued Beth fields.

The new fields are producing a better-grade crude, with a specific gravity of 0.827 (39.6° A.P.I.); the specific gravities of Lower Sidi Fili, Mers el Kharez, Baton and Mellah being respectively of 0.839 (37° A.P.I.), 0.850 (35° A.P.I.), 0.857 (33.5° A.P.I.) and 0.881 (29° A.P.I.). All local fields are characterized by an almost total lack of sulfur.

A whole series of exploration and extension wells are now being drilled in a methodical effort to establish the definite boundaries of the new productive area. Its present proved length is 4,500 ft., with a width of some 1,200 ft. and a thickness varying between 100 and 250 ft. Those figures only cover the proven area, but the northeast and southwest boundaries having not yet been definitely established, the final extent may well prove far larger.

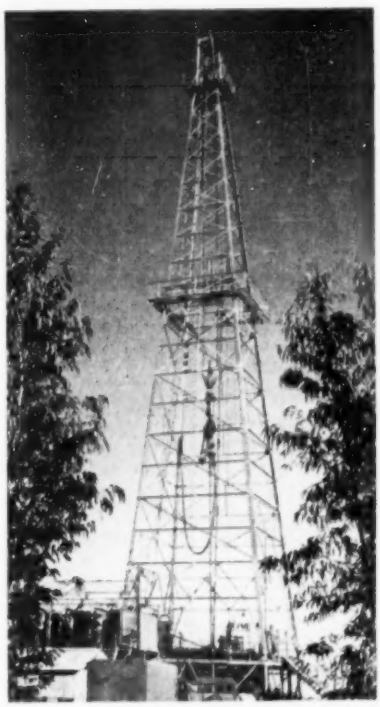
The producing horizons of the new area consist of layers of dense, porous limestone. Communication may well exist among the porous zones, possibly making the structure one reservoir. The operator is wont to stress that the new discovery goes far beyond an increase in the proven local reserves: it opens prospects of development in a northeasterly direction, perhaps doubling the extent of the hitherto existing productive area.

In addition, other tests have uncovered the existence of new exploitable deposits at Bled ed Defaa, north of Baton field. But only one productive well has been brought in here.

In 1952, 82 wells were drilled in French Morocco totaling 290,989 ft., 38 wells and 133,467 ft. thereof having been sunk in exploration (only one productive well), and 130,030 ft. in exploitation and extension, the remainder representing geological drilling.

As of December 11 rigs were active in the country. They are all for the most part American made and operated by American-trained technicians.

Three Wilson rigs are each powered by 200-hp. Buda engines, driving a 7¼ by 18-in. Oilwell mud pump, and a 7¼ by 14-in. auxiliary. One is equipped with a standard 136-ft. Ideco steel derrick, suitable for drilling to 12,000 ft.



As of the first of December there were 11 rigs active in French Morocco, large, medium, and small, and mostly of American manufacture.

The other two are respectively equipped with 133 and 129-ft. Lee C. Moore jackknife masts, both capable to drilling to 12,000 ft.

One of the three medium rigs is an Ideco full-view 98-ft. mast, suitable for drilling to 7,000 ft., powered by two 260-hp. engines, driving a 7¼ by 14-in. Pallieres mud pump. The other two are Rigs 15, equipped with a 127-ft. jackknife, powered by two 200-hp. engines, driving a 7¼ by 14-in. mud pump.

The three smaller rigs are Franks, with an 84-ft. mast, capable of drilling to 4,000 ft., powered by two Cummins 125-hp. engines, driving a 5 by 8-in. Gaso mud pump. As distances in Morocco are great, to promote speed in moving to a new location, S.C.P. is using two heavy-duty trailer-mounted rigs.

Whole Area Surveyed

Together with the general mapping of the territory, S.C.P. has completed aerial magnometer and gravimeter work, followed by a seismic survey, of the whole region comprised between the Atlantic seaboard the edges of the Middle-Atlas, as far east as Fes and Ouezzane, and north as far as the frontiers of Spanish Morocco. This considerable exploratory work has defined the general outlines of the secondary basin and the position of the main horizons favorable for the accumulation of oil. It has especially tested the unsuspected thickness of the sediments in the neighborhood of the Meseta range.

To test many of the seismic prospects logged in 1952, drilling is being stepped up in the eastern part of the Petitjean-Meknes crescent-shaped strip, particularly the Meknes nose, which parallels the oil-bearing structures of the primary Oued Beth substratum.

A 4-in. 23-km. pipe line has been laid from Sidi Fili field to the Petitjean refinery, a makeshift affair primarily designed to treat lignite oil. With typical French ingenuity, it has been coaxed into doubling its original output. Driven by high-pressure gas from BA 1, this museum piece nevertheless succeeded in treating in 1952, almost all the total output of Morocco. Products were: gasoline (14 per cent), light distillate (8.04 per cent), gas oil (31.96 per cent), and fuel oil (45.10 per cent).

The increase in output has compelled S.C.P. to look for an alternative outlet for its fuel oil, whose high freezing point (42° C.) makes it unsuitable for local consumption.

In order to crack this fuel on the spot, in November 1951, S.C.P. contracted with Hydrocarbon Engineering Co. for the erection of a new catalytic cracking unit at Petitjean, under Socony-Vacuum's T.C.C. license.

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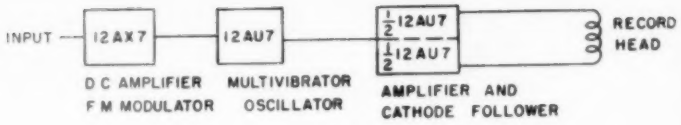

Fig. 1—Block diagram of F. M. record system.

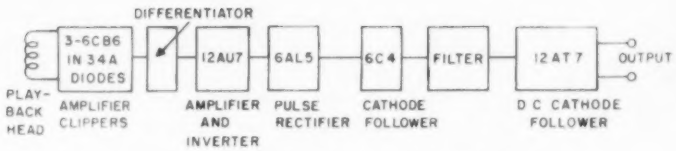

Fig. 2—Block diagram of F. M. playback system.

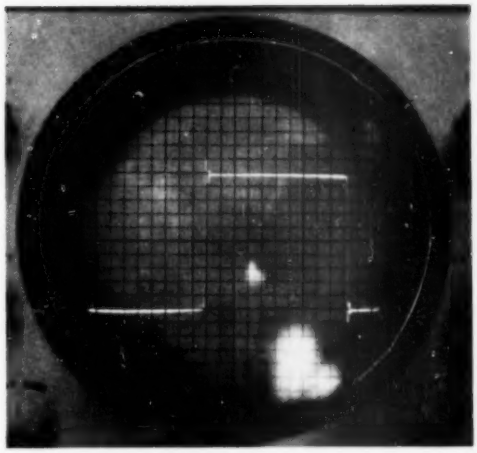

Fig. 5—Response to 50 cycles square wave of F.M. recording system.

Magnetic Recording . . . New Seismic Exploration Tool

Here are some applications

by Myron J. Stolaroff

THE art of magnetic recording has made very rapid progress in the last few years. Advancing beyond the achievement of recording sound so perfectly that tape reproductions cannot be distinguished from live reproductions, the frequency range has been greatly extended and the magnetic recording process utilized in many applications in science and industry.

For many applications, however, it is necessary to record down to very low frequencies, even to d.c., with good transient response and amplitude accuracy. Such results are not possible with conventional magnetic recording as used to record sound, where the input signal is simply mixed with a high-frequency bias to produce a linear transfer characteristic.

Three principal objections occur with such a technique. First, since the output of the playback head is proportional to frequency, response to d.c. is impossible; and practical amplifier design problems prevent obtaining appreciable signal-to-noise ratios much below 30 cycles. Secondly, since equalizing circuits are required to achieve flat frequency response, such circuits introduce phase shifts which result in distorted wave form. Third and most important, where amplitude accuracy is important, considerable variation in instantaneous amplitude of the signal results from the fact that the tape surface is not perfectly homogenous when viewed microscopically. The presence of bumps or nodules lift part of the tape surface away from the head gap, resulting in a temporary reduction in signal which, in many cases, can be of considerable magnitude. Even though tape characteristics are improving steadily month by month, such irregularities are still far beyond the requirements of applications requiring better than 5 per cent accuracy with reasonable frequency response; and in field locations, the presence of dust alone on the surface of the oxide can result in appreciable amplitude variation.

In the field of seismic exploration, the requirements of the recording system are particularly exacting. Response is required down to below 10 cycles with phase shift low enough to result in time delays of less than 1 millisecond, the dynamic range of the geophone output is over 80 d.b.; and transient response and instantaneous amplitude accuracy are of utmost importance. Therefore, to meet the requirements of this and similar applications, a new technique is required.

The F.M. Recording System

A method which offers satisfactory solution to the problems posed above is the use of an F.M. carrier system. By converting the input signal to F.M. form, and recording the F.M. signal on the tape, the intelligence is stored as the rate of zero crossings and is, therefore, independent of reproduced amplitude. Use of a suitable discriminator restores the signal to its original form, free of amplitude variation, with negligible phase shift, and with excellent transient response.

Fig. 1 shows a block diagram of the record system. Since with an F.M. system the variations in tape motion become the noise background, a wide deviation system is employed to overcome the effect produced by flutter in the tape transport. Fig. 2 is a block diagram of the reproduce system. The signal first passes through three stages of amplification and severe limiting to effectively eliminate any amplitude variations in the output of the playback head. The resulting square waves are differentiated to produce pulses of uni-

Author is manager, Application Engineering, Ampex Corp., Redwood City, Calif.
Paper delivered at the eighth national conference of the Instrument Society of America, September 21-25, 1953.

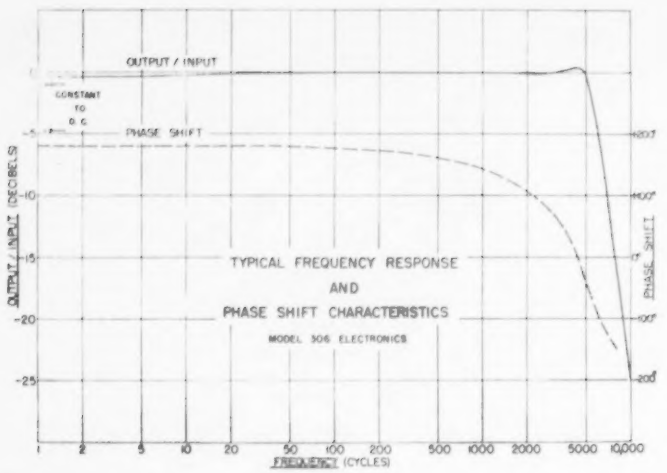

Fig. 3—Typical frequency response of phase shift characteristics of F.M. recording system.

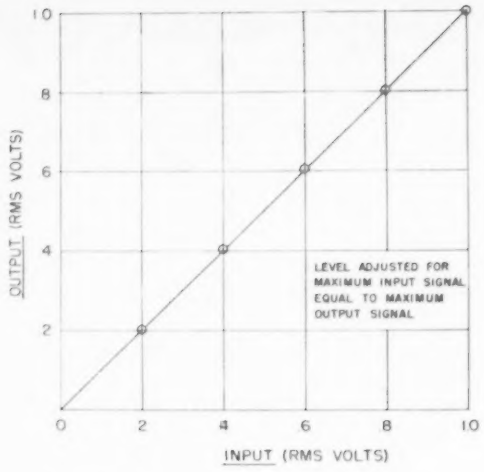

Fig. 4—A.c. linearity of F.M. recording system.

form wave shape, and these pulses are counted in an integrating circuit to yield an output proportional to the time rate of pulses.

Performance characteristics . . . Such an F.M. system is ideally suited for the recording of seismic type information. Equipment now available provides frequency response good to d.c. High frequency response is not a problem since with 30-in. tape, speed a response of 5,000 cycles can be obtained. Fig. 3 illustrates typical frequency response and phase shift characteristics at 30-in. tape speed. Since the time duration of a record is less than 10 seconds, adequate storage capacity is obtained even with high tape speeds of 30 in. per second. Tape speed may, therefore, be kept high to minimize the effect of flutter and achieve maximum signal-to-noise ratio. With 5,000 cycles response, the signal-to-noise ratio of this system is over 40 d.b., based on a peak signal of 2 per cent over-all harmonic distortion. Since for seismic work the response may be limited to 500 cycles or less, and since flutter occurs primarily in a broad band around 3,000 cycles, limiting the frequency response of the system results in raising the signal-to-noise ratio 45 to 50 d.b. The system may be operated at lower tape speed for greater storage capacity with only slight reduction in signal-to-noise ratio. Linearity of the over-all system is illustrated in Fig. 4. Square wave response is shown in Fig. 5.

Multichannel Recording

In seismic work, it is desired to record a large number of channels simultaneously so that the outputs of a quantity of geophones can be accurately compared in time. To do this a multitrack head assembly, in which heads are stacked one above the other with adequate shielding between heads to prevent crosstalk between channels, is used. Since the amount of shielding required to prevent crosstalk is appreciable, it is possible to stagger a second stack of heads between the first, thus, allowing the recording of 14 tracks on tape 1 in. wide.

Electronic assemblies are designed in strip form so that any desired number of channels may be assembled for the particular requirement. In addition to the tape transport, electronic assemblies, and associated power supplies are a tuning-fork amplifier to provide constant 60 cycles to the drive motor independent of field power supply frequency variations and the necessary dynamotors and converters to operate the equipment from batteries. By forming a record into a loop and allowing the excess tape to fall into the basket, a single record may be played over and over for continuous analysis.

Electrically Reproduced Signal

The greatest asset of a magnetic recording system, when used for geophysical work, is the fact that the output signal is live. Thus, it is possible to conduct a number of different types of operations on the signal in order to yield the most useful information for analysis.

For example, during the making of the records, it is customary to employ filters in the geophone amplifiers to reduce reverberation noise and accentuate the signal of interest. Since this is a matter of terrain and similar considerations, proper choice of filter characteristics depends upon the skill and judgment of the operator. With the magnetic recording system, the operator is relieved of this responsibility; since the records may be filtered on playback. Furthermore, the records can be played over and over again until the best possible combination of filter characteristics is obtained.

By repeated reproduction of wide-band records with filters set to various bands, shallow, medium, and deep reflections may be examined from one shot record. Also, gain and mixing characteristics can be varied so that particular sections of the record, which are of interest, can be blown up. The dynamic range of the process is sufficiently great so that portions of the record, which on an oscillograph reproduction have dwindled to mere lines, can be blown up to show significant fluctuations. Such a record, if originally recorded photographically, would have been permanently lost. Still other possibilities include the transposition of traces so that any particular set of traces may be more carefully compared by placing them adjacent to each other.

Another technique, which is quite useful in analysis, is to provide reproduce heads which may be shifted with respect to each other. Thus, individual adjustment of each playback head results in shifting the corresponding signal in time with respect to the others. In certain types of terrain, such shifting may be of considerable aid in recognizing reflection patterns. Also, if provisions are made whereby the heads may be shifted in constant increments of time, the reproduce system may be used for correlation operations.

Possibly the most powerful tool, which when properly developed may allow the most complete and exhaustive analysis of the recordings, is the use of correlation techniques. By means of proper statistical analysis, it may be possible to establish characteristic functions corresponding to certain geological conditions. Should this prove possible, then it would only be necessary

Unattended "booster" stations—inter-spaced with regular pumping stations—increase pipe line capacity 25%

Close-up of equipment at unattended "booster" station. Cabinet open at right displays 960-mc RCA Microwave transmitter-receiver

How remote supervisory control (via Microwave) helps SUNRAY reduce pipe-line operation costs

TWO YEARS of successful operation have proved that Sunray Oil Corporation's microwave system is a cost-cutting investment. *Two* operating positions now fully control *five* pumping stations. At the same time, 25% *greater volume can be run through the pipe lines.*

A 97-mile pipe line is used to interchange products between the company's refineries at Sunray Village (Duncan) and Allen, Oklahoma. An attendant at the main pumping station controls and monitors two unattended booster pump stations. On another pipe line 85 miles long, the operator at the main station controls a "booster" 31 miles away. On both pipe lines, RCA 960-mc Microwave systems link the control points and remote-operated "boosters."

HANDLES MANY CHANNELS

Sunray engineers selected RCA Microwave on the basis of cost, reliability, and capacity. Because of its capacity, microwave is the least expensive form of communication *per channel mile.*

Maintenance-wise, too, microwave cuts costs. Unattended relay stations, spaced miles apart, cost less to maintain than direct wire. RCA Microwave is virtually weather-proof . . . outage time is next to zero.

HAS HISTORY OF RELIABILITY

Since 1946, RCA has installed many fully reliable microwave systems, some over a thousand miles long. All have proved themselves in performance—for utilities, government agencies, telegraph companies, turnpikes, as well as pipe lines.

In addition to remote control and supervisory functions, RCA Microwave provides as many voice and teletype channels as needed—and does it with a minimum of frequency space. It employs readily available tubes and familiar circuits which are easy to service. It can be interconnected with telephone lines, switchboards and mobile communication systems.

COMPLETE SERVICE AVAILABLE

If desired, RCA supervises survey, construction and installation—provides a complete single-source, single-resj onsibility service. *For complete information, mail the coupon below.* And remember, the RCA Service Company provides nation-wide installation and service facilities.

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Without obligation on my part, please send me your *free* booklets on:

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Name_____ Title_____

Company_____ Address_____

City_____ Zone____ State_____

☐ Have an RCA representative get in touch with me.

to run each magnetic record through a correlation computer and automatically compute the correlation to the function of interest. This would reduce the analysis of recordings to only a few minutes per record. Another very interesting thought is that if such a technique should prove feasible, even should it take many years to establish the necessary correlation functions, every magnetic record taken up until that time could immediately be analyzed. Considering the great expense of operating crews in the field to take these records, this possibility of extrapolating much additional information, when the proper techniques are developed, should alone justify the use of magnetic recording equipment.

Packaging . . . With the capabilities of the magnetic recording process now well established and proved, the next step becomes one of providing suitable packaging designed to meet the requirements of field operation.

Therefore, existing development work is directed toward producing equipment which is suitably miniaturized and compact, with minimum power drain, and with due attention given to operating and record-handling conveniences. Also, rugged and durable construction is required to meet the rigorous environmental conditions encountered in field operations.

Conclusions

An F.M. recording system has been described which meets the accuracy requirements for geophysical exploration. Having excellent low-frequency response, negligible low-frequency phase shift, and good amplitude accuracy, this system makes available a recording system having improved frequency response and dynamic range to geophysical users. The provision of an electrical signal makes possible many analysis techniques never before possible, such as post-recording filtering, variations in gain and mixing, and transposition of traces. Also made possible with such an electrical output is the use of correlation techniques, which if properly exploited, promise to greatly enhance the amount of information resulting from seismic records.

Crude Line Automatically Controlled

(Continued from page 78)

preceding the suction split. This controller is set approximately 50 psig., while the normal setting for the separate Longview and Lucas suction headers is 30 psig. Thus, any excess incoming pressure is drawn off by diverting a portion of the stream to Wortham tankage. This drawoff maintains a more stable residual at Wortham and permits the Ranger station to more easily fix its gradient.

However, the prime function of the additional controller is to divert full Ranger flow to tankage in the event of total shutdown of the Longview and Lucas segments from power failure or other causes. The 16-in. control valve was sized to handle this full flow.

Wortham flow control . . . Current Wortham operation is unique in that both the outgoing segments, Longview and Lucas, are directly flow controlled. The suction and discharge control settings of each segment remain at their normal values and the flow override set pointer is adjusted to hold the desired flow rate.

This operation permits a daily dispatch assignment to be executed more precisely and conveniently. The designated block is reduced to flow-rate units and the flow pointer set accordingly. As long as suction and discharge pressures remain within the limits of their respective control settings, flow is maintained at the set rate. Near the end of the allotted time, the rate may be readjusted slightly to round off the total volume.

The two Lucas segment charts, Fig. 3, illustrates this operation. Charts were on at 7:00 a.m. with Wortham relaying from Ranger. At 9:45 a.m. the terminal stream was diverted to Sour Lake. Although station outbound (discharge) pressure dropped 80 psig., the flow rate remained unchanged. At 3:15 p.m. the rate was slightly raised. At 5:30 p.m. a swab was entered, with unavoidable disruption. At 8:45 p.m. the terminal stream was switched straight to Lucas again, causing outbound pressure increase. Again, the flow rate was unchanged. At midnight Wortham suction was switched to tankage with consequent increase in suction and station case pressure. Between then and 6:00 a.m. station suction pressure decreased with tank level. In spite of this and the fluctuating outbound pressure, the flow rate remained fixed.

While this method of controlling a station rate can be successfully accomplished, by no means is it advocated for more than one station on a pipe line operated completely "tight." Casual observation will show that if two stations next to each other are both placed on flow control it will be only a matter of time until one or the other will pass from flow to either suction or discharge pressure control. This is due to the fact that it is physically impossible for the operator at each station to fix his flow rate at identically the same value, measured to the fractional barrel. Because of this limitation, one station would consistently lead or lag the other on flow.

As shut-down provisions are beyond the scope of this article they are dispensed with briefly.

Conventional bourdon-actuated mercury switches perform a pump unit shutdown if safe temperatures are exceeded at the motor winding, motor bearings, motor air, pump case, and pump bearings.

Air supply . . . Extra attention was devoted in planning a reliable air supply for the pneumatic control system. Each station includes an ample-size motor-driven air compressor, discharging directly to an outdoor receiver equipped with a water trap which is tripped daily. Outdoor temperature is thus utilized to help drop out water from instrument air. From the receiver, air reenters the station through a strainer and then passes through a solid-desiccant air dehydrator designed to condition the air to minus 32° F. dew point at 80° F., entering air temperature. Downstream of the dehydrator the air is reduced in pressure to system requirements, this having an additional drying effect. Under normal system consumption, the compressor operates 25 per cent of the time.

In addition to the chart records of suction, discharge, and case pressures, each station console panel contains ammeter-type electric indicators which show these pressures directly in pounds per square inch gage. Bonded strain-gage-type pressure cells transmit these measurements electrically to the indicators.

All station control rooms on the line are pressurized to exclude pump-room hydrocarbon vapors. An alarm warns the operator if the control room pressure approaches atmospheric level.

Volume boosters are employed on all station discharge control valves to produce high-speed stroking in a closing direction.

Additions to system . . . Since the original system went on stream, construction has begun on new intermediate booster stations on the main artery at Abilene and Blum, and on the Wortham-Lucas segment at Trinity. With full pumping units in operation at these new stations, final ultimate capacities will become:

Colorado City to Wortham—440,000 bbl. per day.

Wortham to Lucas—330,000 bbl. per day.

Wortham to Longview—210,000 bbl. per day.

Instrumentation at these new intermediates follows the same system engineered for the rest of the line—designed for continuous and economical station operation.

Simplify Your Oil and Gas Calculations—2

by Louis J. Murphy
International Engineering Associates, New York

Chart 2 is presented to facilitate estimation of heat-transfer area. Example for use of this chart was given in the preceding installment. Chart 3 for estimating heat required for heating gas will follow.

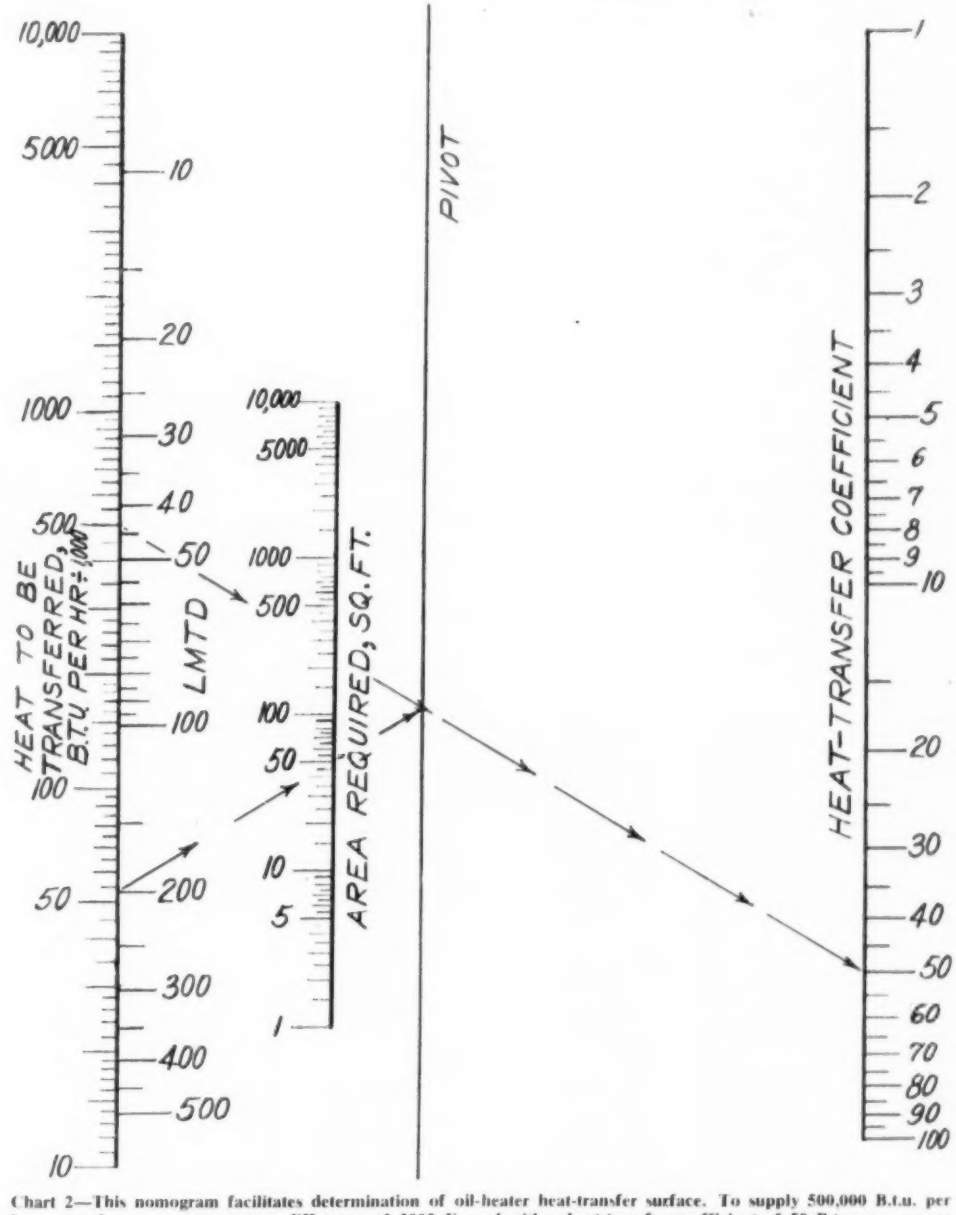


Chart 2—This nomogram facilitates determination of oil-heater heat-transfer surface. To supply 500,000 B.t.u. per hour at a log mean temperature difference of 200° F. and with a heat-transfer coefficient of 50 B.t.u. per square foot per hour per °F. requires 50 sq. ft. of transfer area as read from the chart.

Underground Corrosion

New Techniques in Control

by O. C. Mudd

THE first three parts of this series appeared in the Journal issues of November 30, December 7, and December 14.

Better Coatings Needed

Many bitumen coatings marketed during the past have, when properly applied and handled, given good results on small-diameter lines but the advent of large-diameter lines has made new demands in coating requirements and few if any of those presently marketed can meet this demands.

Requirements of a good coating are:

1. Resistance to cold flow.
2. Some degree of resilience.
3. A low moisture transmission rate.
4. Good bonding qualities.
5. Immunity to fracture by temperature change or mechanical shock.
6. Reasonable in cost and easy to apply.

Author is senior corrosion engineer, Shell Pipe Line Corp., Houston. Paper presented before session on transportation, annual A.P.I. meeting, Chicago, November 10, 1953.

Cold flow, i.e., slow viscous flow at normal temperatures, results in gradual coating displacement by the force of gravity or other forces or pressure that continue until the originally coated surface is exposed thus inviting corrosion. If cathodic protection is supplemental to the coating these metal surface exposures increase protective current requirements.

Cold-flow characteristics of coating materials approximating that to be expected in actual service have been observed on magnesium test coupons buried in hygroscopic soil contaminated by sour crude. Coating failure at the top of a test coupon by cold flow from soil stress is illustrated in Fig. 7. Coating on or near the bottom is less affected where moisture remained more constant in the soil. This material was a standard coal-tar pipe-line enamel 3/32-in. thick. Failure was indicated after 373 days and the test terminated at 574 days.

The test results shown in Fig. 8 illustrate the effect of soil stress and oil on a standard 3/32-in. asphalt coating. Failure occurred in 72 days and this specimen was removed from test at 284 days.

Asphalts modified by catalytic treatment or reacted with resins are showing favorable results in this same soil bed. Fig. 9 shows one of the latter type material photographed after 897 days of test without failure. This material has continued under test and remained effective to date, a period of over 5 years.

Penetration tests on coating materials conducted with an improvised penetrometer such as illustrated in Fig. 10 give an index of cold flow; however, such tests should extend over long periods of time to obtain information of real value.

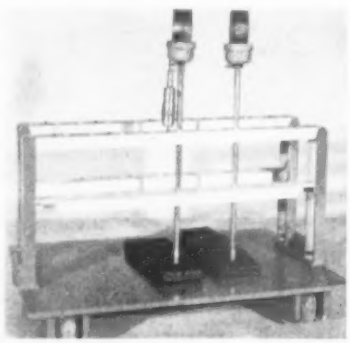


Fig. 10—Coating penetrometer devised for long-period coating-penetration tests.

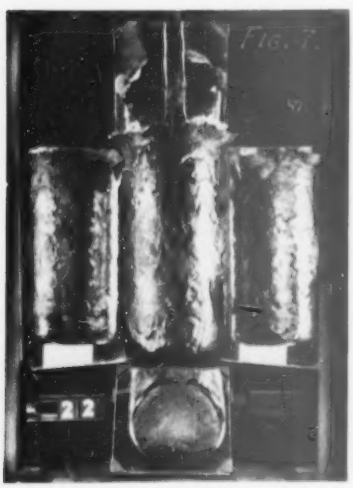


Fig. 7—Illustrating soil stress effects on standard coal-tar enamel.

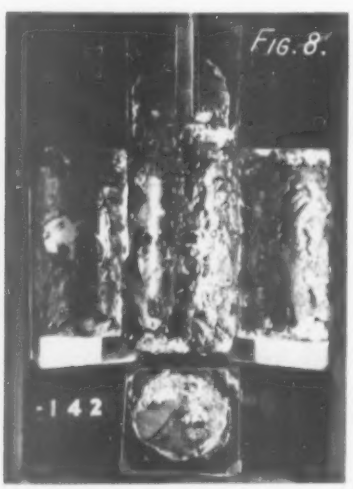


Fig. 8—Illustrating soil stress and oil-damage effects on normal asphalt enamel.

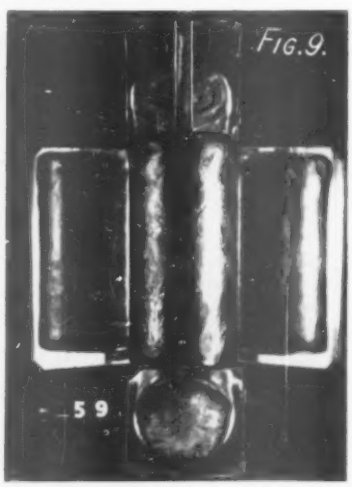


Fig. 9—Illustrating stability of modified asphalt enamel.

How to Design and Evaluate Absorbers—7

by R. J. Hull and K. Raymond

5. Lean-Oil Molecular Weights

THE interrelation of lean-oil molecular weight, gravity, and A.S.T.M. distillation 50 per cent temperature is shown on Fig. 11. In absorber evaluation work, it is preferable to use values from this chart instead of single laboratory values. In our experience, the chart always has given reasonable accuracy. On the other hand, errors in the usual random experimentally determined molecular weights may be as high as 10 per cent.

Authors are with California Research Corp., Richmond, Calif. Paper presented at California Natural Gasoline Association meeting, Los Angeles, October 8-9.

Methane . . . Katz and Hachmuth values from Ind. Eng. Chem. 29, 1072-1077 (1937) are used with a

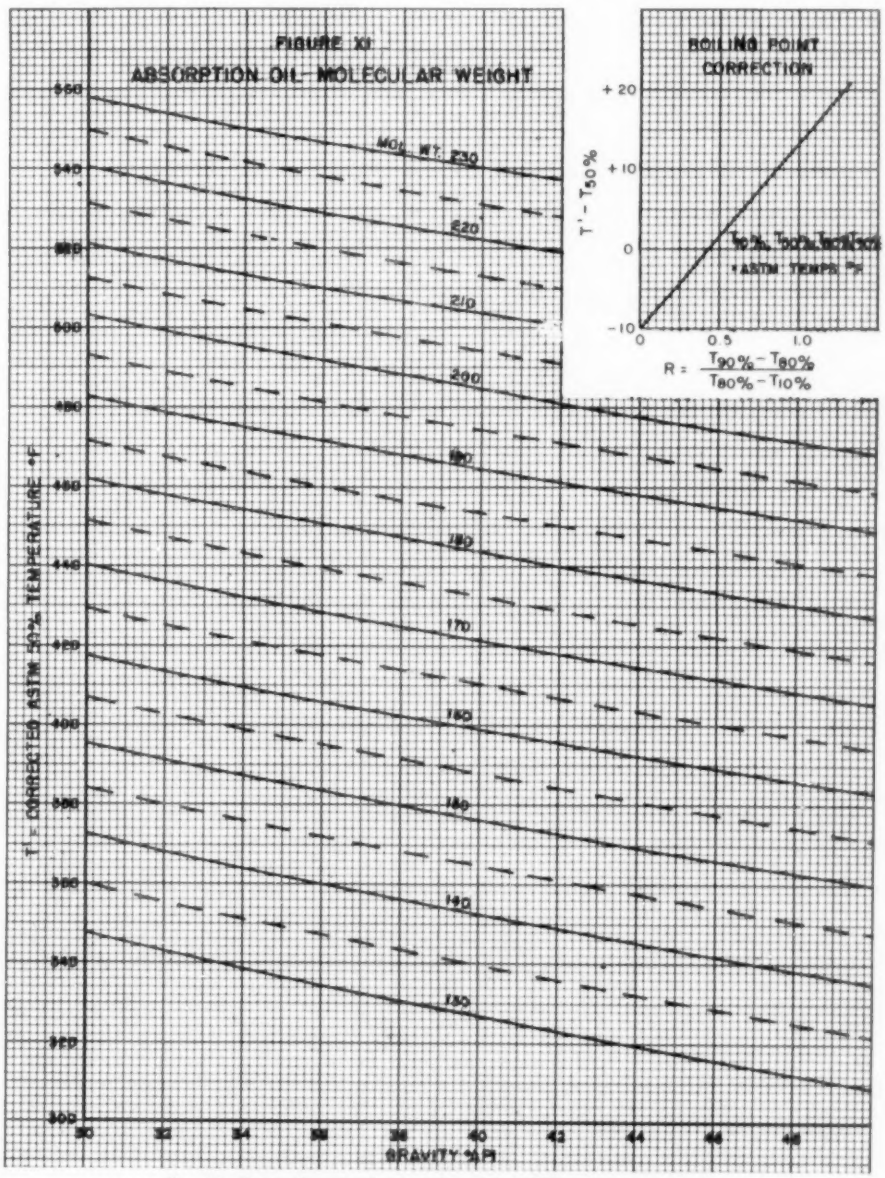
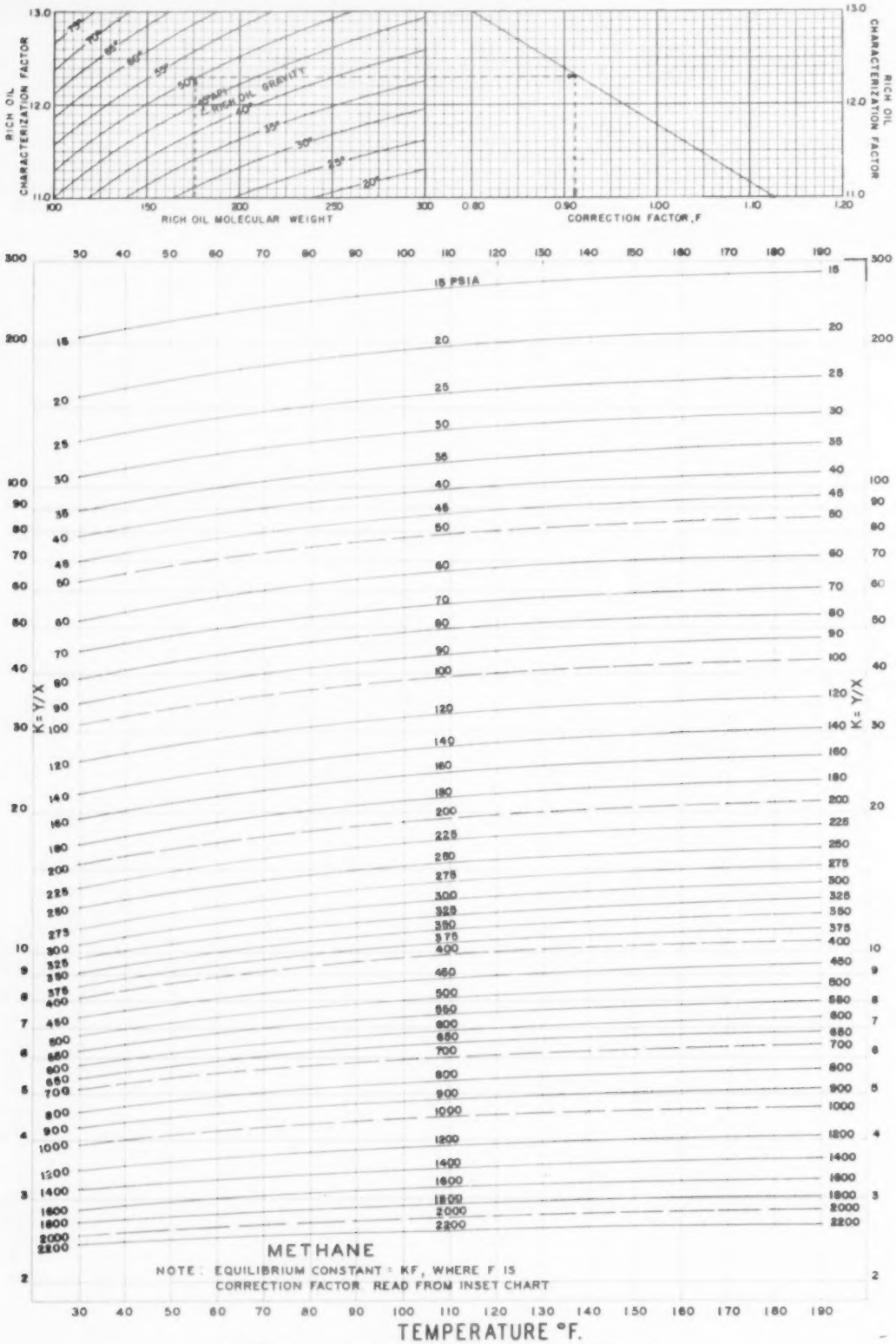


Fig. 11—Lean-oil molecular weights with boiling-point correction.

correction for the characterization factor of the liquid phase. The correction factor thus includes the effects of system boiling range and density, and is based on data for methane in a wide variety of systems, hence, corrected methane K values should be applicable to a wide range of absorption systems.


RICH OIL CHARACTERIZATION FACTOR
RICH OIL MOLECULAR WEIGHT
CORRECTION FACTOR, F
API RICH OIL GRAVITY
15 PSIA
K = Y/X
METHANE
NOTE: EQUILIBRIUM CONSTANT = KF, WHERE F IS CORRECTION FACTOR READ FROM INSET CHART
TEMPERATURE °F.

Equilibrium constants for methane, with correction factor, F.

ELECTRIC LOGGING—16

Response of Three-Electrode Device When More Than One Bed Is Present

by R. I. Martin

FIG. 1 summarizes the effects shown in Fig. 2 (A - E) of Installment 15 and includes data for the case of beds 100 times more resistant than the surrounding shale. The minimum apparent resistivity which occurs at the critical thickness is apparent. Also to be noted is the increase in apparent resistivity below the critical thickness. The difference in response of the highly resistant bed is more marked in this region because of the averaging effect of the electrode spacing and also the damping effect of the mud in the bore hole. In this figure the solid lines are computed values and the dash lines are experimental values.

The response of the three-electrode curve opposite salt water sands with a resistivity lower than that of the surrounding shales is not illustrated. It may be stated, however, that the depression obtained is in all cases wider than the bed thickness by an amount equal to the electrode spacing. In this, the behavior of the three-electrode curves is similar to that of two-electrode curves.

Fig. 2 shows the distortion which will occur when more than one bed is present. The solid curve would be obtained if only the lower bed were present. A reflection peak occurs below the bed. The broken curve will be obtained if the upper bed is present as well. A dwarfed resistivity peak may be recognized opposite the lower bed even though this lies in the blind zone. Reflection peaks caused by both beds may be noted.

Fig. 3 shows a case where a sequence of beds occurs. The position of these beds has been determined from the monoelectrode curve shown by the broken line. The response of the three-electrode curve is in marked contrast under these conditions.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

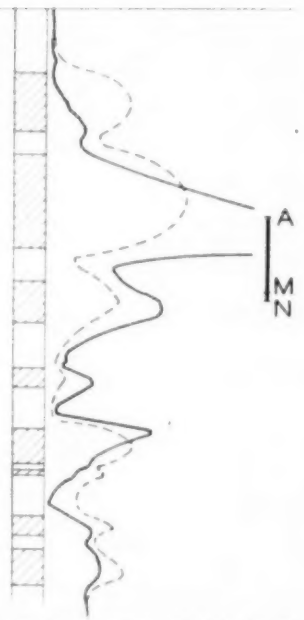


Fig. 3—In a sequence of beds the three-electrode curve (solid line) is in marked contrast to the monoelectrode curve.*

*From "Electric Well Logging," a copyrighted manual by Herbert Guyod.

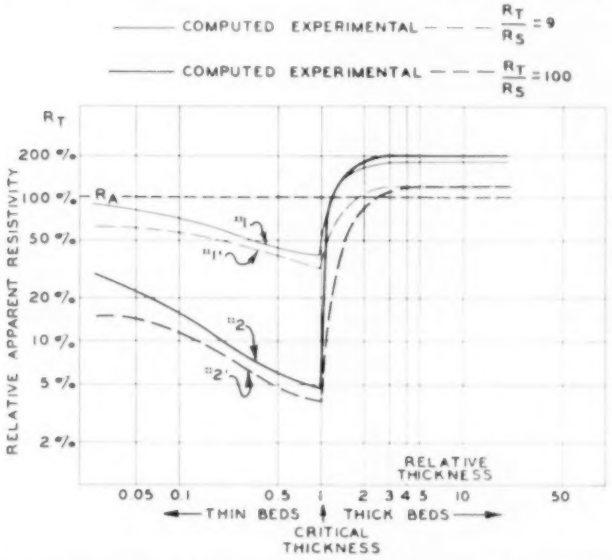


Fig. 1—Summary curves illustrating effects of beds of varying thicknesses including data for the case of beds 100 times more resistant than the surrounding shale.*

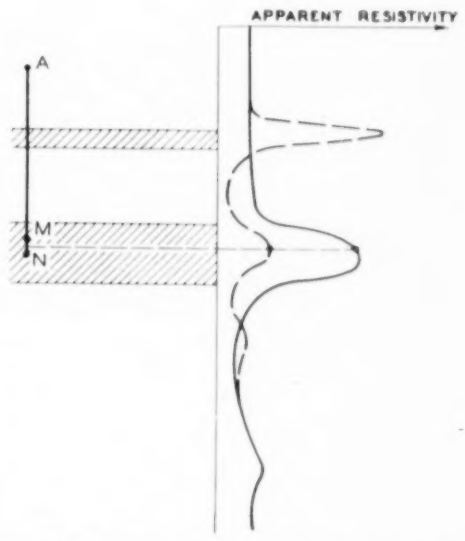


Fig. 2—Curve shows the distortion occurring when more than one bed is present.*

QUESTIONS ON TECHNOLOGY

TABLE 1—APPROXIMATE ENERGY PRODUCTION OF THE UNITED STATES PER CAPITA SINCE 1805

Year	Population, millions	B.t.u. equivalent of mineral and water power, trillions	Trillions B.t.u. per capita	Mechanical slaves relative to 1805
1805	6.2	*4.4	0.71	1.0
1815	8.4	*7.8	0.93	1.31
1825	11.0	*15.2	1.38	1.95
1835	15.3	*50.3	3.28	4.62
1845	20.0	*142.0	7.1	10.0
1855	27.0	*440.0	16.3	23.0
1865	35.0	†*781.0	22.3	31.4
1875	44.0	†*1,670.0	38.0	53.5
1885	56.0	†*3,490.0	62.0	87.2
1895	69.0	†*6,050.0	88.0	124.0
1899	76.0	7,410.0	97.5	137.0
1910	92.0	15,380.0	167.0	235.0
1920	105.7	21,960.0	208.0	293.0
1930	122.0	25,070.0	206.0	290.0
1940	131.7	25,220.0	192.0	270.0
1949	150.0	36,600.0	242.0	341.0
1953	152.0?	40,000.0?	262.0?	369.0

*To coal was added 10 down to 4 per cent starting with 10 per cent in 1805.
†To coal was added 0 up to 10 per cent starting with zero in 1865.

Horsepower . . . Comparison With "Manpower"

by W. L. Nelson
Technical Editor

"Can you compare the energy produced by oil, coal, etc., in the United States with the energy produced by man?" S. M. T.

No. Such a comparison is not available nor is such a comparison of much practical significance. A specific comparison is not possible because who knows how much energy the average man produces? In fact, the energy output of a horse is not actually known, even though we widely employ the term "horsepower" to designate 33,000 ft. lb. per minute (about 7,400,000 B.t.u. per year of 8-hour days). Among department-store floorwalkers, typists, hod carriers, housekeepers, ditch diggers, truck drivers, watch-repair mechanics, hunters, trappers, shepherds, topping-plant operators, etc., there is such a great variation in mechanical energy output that manpower can scarcely be defined. However, a cement carrier that moved 12 sacks of cement per hour through a distance of 20 ft., would produce about 90,000 B.t.u. per 365-day year of 8-hour days.

The energy used in the United States since 1899 from coal, oil, gas, and water power (Petroleum Facts and Figures of A.P.I.) is shown in Table 1, as well as approximate figures since 1805, based on coal production (Bituminous Coal Institute). According to the last column, man in the United States today has 369 times as much power at his disposal as did man in 1805. This does not mean, of course, that he is better off by 369 fold because to a large extent the energy is wasted on luxuries (most foods, clothes, radios, etc., are luxuries) and such luxuries as wars. The utilization of power by automobiles and airplanes is grossly inefficient because most of their energy is expanded in gaining momentum and churning air. Note that the United States faltered only once during these years, namely, between about 1923 and 1940 when a currency inflation followed by meddling of our Government hindered our normal ability to develop.

If it be useful to consider a specific manpower unit, the figures of Table 1 can be extrapolated back to the year when each man had only 60,000 B.t.u. per year for his efforts. Such a straight-line extrapolation indicates a date earlier than about 1450, but of course, such a situation arose at different times in various regions of the earth and in fact, retrogressions were common. There is no reason to speak in terms of manpower because the numbers are enormously large, being 1.0 in about 1450 (or earlier) but perhaps 2,920,000,000 man slaves in 1953 (or 35 million horsepower).

Loss of Additives During Reclaiming

"Would appreciate if you could advise whether the additives used in heavy-duty motor oils (MIL-2104) are removed during reclaiming operations? Also advise if the additives are retained if the oils are merely heated and filtered?" G. F. F.

There are in general three types of reclaiming operations:

1. **Complete** — Nearly a duplication of the refining processes that were used in the petroleum refinery when the oil was originally produced.

2. **Adsorption filtering** — This is the common type of reclaiming operation. It involves heating to improve the flash point and to assist in filtering through adsorbent clay and mechanical filters.

3. **Mechanical filtration**—Any existing particles of solids are removed by flow through a filter.

It is obvious that the first or complete reclaiming operation involving vacuum distillation (of the oil) or extensive treating, extracting, and filtering, would in most instances remove substantially all of the additive agents. Likewise it is almost clear that little if any of the additives would be removed by the plain mechanical filtration of the third type of reclaiming operation. However, there is a possibility that part of the additive material in the oil would be destroyed or used while the oil was in service. Thus, even when the plain mechanical filtration of Method (3) is used it would still be necessary to check on the amount of additive in the filtered (reclaimed) oil and perhaps to supply additional amounts of additive materials.

The most important consideration is the second method of reclaiming and unfortunately, it can only be said that very many different additive materials are used and that some of these will be removed in part during filtration through adsorbents. In most instances, it will be necessary to replace the additives that are removed by the filtration. Inasmuch as the second type of reclaiming, adsorption filtration, is by far the most widely used reclaiming process, the only safe thing to do with an unknown reclaimed oil is to supply additives.

EQUIPMENT MEN . . . in the News

United Supply Promotes Three In Sales Division

L. W. MOORE

United Supply & Manufacturing Co., of Tulsa, has announced these promotions in the West Texas and New Mexico divisions: Loyd W. Moore has been promoted to district manager of the West Texas and New Mexico division; Roger B. Northrup is now area manager of the West Texas and New Mexico division,

R. B. NORTHRUP

DON JOHNSON

with headquarters in Dallas; and Don Johnson is the new assistant district manager of stores in West Texas and New Mexico, with headquarters in Midland.

Moore, who has been with the company for 13 years, was district manager of the North district, with offices at Hobbs, N. M. Northrup has served United Supply at Odessa, Sundown, and Midland, Tex., and has been with the company since 1941.

H. B. Gutelius, Jr., president of United Supply, said these promotions are part of a program to step up both service and sales to customers in this important area.

Gary Made President of Attapulgus Minerals

Attapulgus Minerals & Chemicals Corp., through board chairman David E. Lilienthal, has announced the election of Wright W. Gary as president and chief executive officer. The appointment becomes effective January 1.

For the past 11 years, Gary has been president of Filtrol Corp. During World War II he was national director of refining for PAW.

Gary succeeds Louis R. Streander, who will retire as president on January 1 after more than 40 years' service with the company. He will continue to serve Attapulgus as senior consultant.

Moran, McNeill Promoted By Dowell Incorporated

Dowell Incorporated has promoted J. P. Moran to district engineer for the company's Houston district, J. S. Talbot, district manager has announced. Moran, who will make his headquarters in Houston, succeeds E. F. Kelly, who has been transferred to Midland, Tex., as district engineer in the Permian basin.

Moran has been with Dowell 6 years. He was service engineer at Grayville, Ill., for 2 years prior to his transfer to Alice, Tex., in 1949. Since then, he has been sales engineer, area engineer, and area manager at Alice. He has been active in the development of Dowell's Stratafrac service in the Houston district, which includes the Texas Gulf Coast and all of Southwest Texas.

H. E. McNeill is being transferred from Lafayette, La., to Alice where he will be area enginer. McNeill has been with Dowell 3 years. He was station manager at Lafayette, in the company's New Orleans district, at the time of his transfer.

Baroid Announces Sales Division Changes

Baroid Sales Division has recently announced the following changes in its staff: R. E. Souther, employe for 14 years, was appointed manager of the new equipment department. This new department is a consolidation of the transportation department, testing equipment department, and the

R. E. SOUTHER

J. M. BUGBEE

BLACKBURN

well-logging shop. James M. Bugbee, Jr., is the new district sales representative for Baroid in Oklahoma City. He

Norris Holds Annual Sales Meeting

Field men and managers from all territories convened in Tulsa November 18 through 20, at the Mayo Hotel, for the annual sales meeting of W. C. Norris, Manufacturer, Inc. Bill Davidson, sales manager, headed the conferences. Considerable discussion, led by Al Hardy, chief engineer, was spent on the new Type 35 sucker rod, just placed on the market. Plant visitations and schooling in all new phases of product design, manufacturing processes, and shipping practices completed the program. Those attending, seated are: Paul Hagaman, Salem, Ill.; Jack Schaff, Wichita Falls, Tex.; A. C. Cloud, Odessa, Tex.; Hamp Brooke, Houston; Dan Coates, Abilene, Tex.; A. L. Ethridge, Oklahoma City; Arthur Miller, Jr., assistant sales manager, Tulsa; LeRoy Mitchell, Casper, Wyo.; J. E. Giles, Tulsa; Jere Whitaker, Fort Worth. Standing are: Clyde Sights, Evansville, Ind.; C. B. Schofield, Tulsa; C. T. Fair, Great Bend, Kans.; Don Stewart, Midland, Tex.; J. H. Coman, manager material control, Tulsa; Jack Getty, Shreveport; C. L. Snelling, Houston; W. C. Tolleson, Kilgore, Tex.; Kenneth Cook, Abilene; Marvin Parker, Odessa; Doyle Bain, Corpus Christi; and William Butler, executive vice president; G. W. Davidson, sales manager; and E. C. Bolger, president, Tulsa.

replaces R. R. Morris, who has been transferred to Canada. Clifford P. Blackburn, former news reporter and photographer, has been named advertising assistant.

Bugbee has been with Baroid more than 7 years. Most of his service has been in the field as a mud engineer, although he was first employed as a well logging engineer. Blackburn will assist in the editing and designing of all advertising and sales promotion items.

National Makes Hoevel Northwest Manager

K. O. HOEVEL

Kenneth O. Hoevel, for 9 years division sales manager of the Midwest division of National Supply Co., with headquarters at Tulsa, has been promoted to division manager of the Northwest division.

In his new position, Hoevel will have his headquarters at Denver. He succeeds J. W. Gillespie.

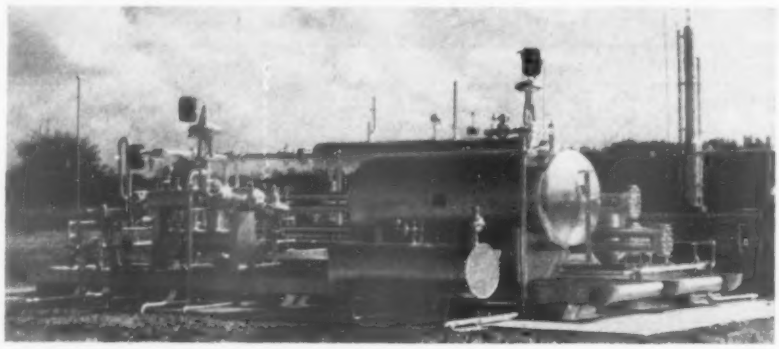
Hoevel started with the company in 1935 as a store clerk, serving at Oklahoma City and Seminole. In 1937 he was sent to the Torrance, Calif., plant for training in sales and service work on rotary drilling equipment, then spent 2 years in this work in the oil fields of Kansas. He was appointed a sales engineer at Tulsa in 1939, and became general foreman of the assembly department at the Toledo plant in 1942. He was named division sales manager at Tulsa in 1944.

Marlow Inaugurates New Advertising Program

A new 1954 advertising and merchandising campaign has recently been scheduled to break in January for Marlow Pumps, manufacturer of a line of self-priming centrifugal, straight centrifugal, plunger, and diaphragm pumps, it has been announced by A. S. Rubin, general sales manager of Marlow.

Themed to the slogan "Don't buy a pump . . . buy a Marlow," the advertisements emphasize dependability and efficiency of Marlow pumps and feature on-the-spot shots of pumps in action. It is estimated the advertisements will reach 5,192,000 potential customers.

New Name Covers B.S.&B. Cold Separation Systems



One of B.S.&B.'s Cold-Frac systems.

Black, Sivalls & Bryson, Inc., manufacturers of oil-field storage and field processing equipment, has announced a new trade name, "Cold-Frac," covering its line of low-temperature-separation equipment, which includes glycol-injection systems, conventional low-temperature-separation systems, and low-temperature natural-gasoline plants.

The name, Cold-Frac, properly describes the process of these systems: the separation of natural gas from its condensable fractions at low temperature, and the subsequent stabilization or fractionation of the condensate to specification product.

All systems in Cold-Frac line are made up of separate elements of B.S.&B. standard products, assembled to handle efficiently each problem encountered in the production of gas-condensate wells and in the processing of gas produced with and separated from crude oil.

Cold-Frac systems for gas-condensate well production are available both with and without hydrate inhibitor. The system without inhibitor is the simplest in the line; after free water is removed, high-pressure gas is expanded into a special separator where hydrates are formed and melted. This system is necessarily limited to operation above the hydrate-formation temperature up to the point of expansion and can be used only where high-pressure drops are available.

The Cold-Frac system with hydrate inhibitor (B.S.&B. glycol injection system) allows the use of regenerative heat exchange, making it applicable to a wider variety of situations because less expansion is required to achieve maximum recovery. Both systems normally include stabilizers to provide an end product of stable condensate that can be sold from lease stock tanks.

Cold-Frac natural-gasoline plants are offered in two types, both involving low-temperature separation with hydrate inhibitor. One system, applicable to high-pressure, high-gas-oil-ratio oil wells, uses the same principle of expansion refrigeration that is applied to gas-condensate well production. Condensables are fractionated to produce specification natural gasoline and L.P.G. products. The other system, used for processing the casing-head gas that is separated from low-pressure oil-well production, uses mechanical refrigeration to reduce temperatures to a point where condensables can be separated.

Darling Names Evans to New Regional Position

M. Stuart Evans has been appointed eastern regional sales manager by Darling Valve & Manufacturing Co., Williamsport, Pa., effective January 1.

Evans joined Darling in 1950. He served in U. S. Army Ordnance in the last war. He attended University of Kansas at Lawrence. Evans is married, has four children, and is expecting to make his permanent residence in New York shortly.

Oil Base Mid-Continent Office to Houston

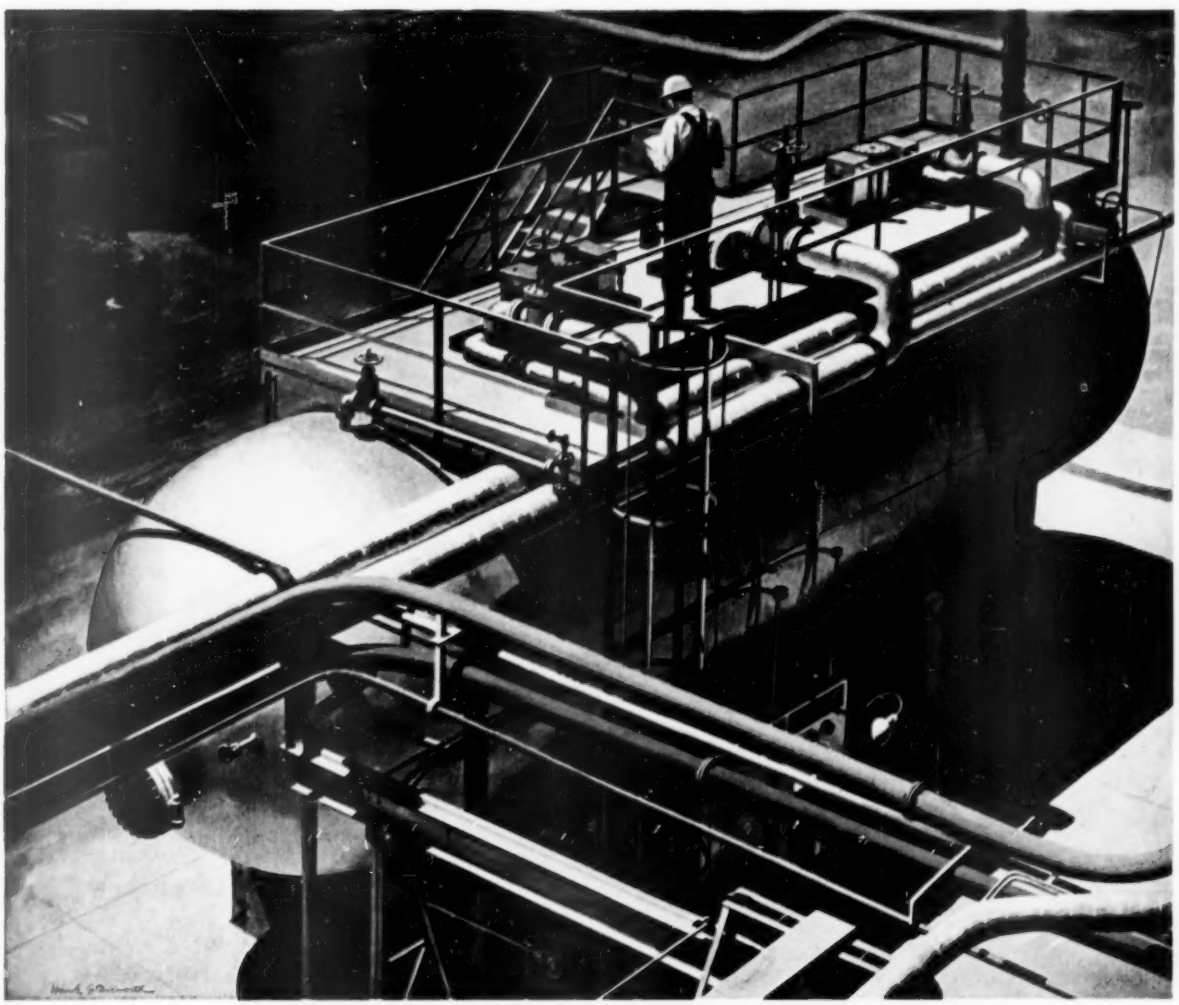
Oil Base, Inc., has announced the moving of its Mid-Continent division office from Fort Worth to Houston. A new control laboratory and additions to its plant on Market Street Road in Houston have recently been completed. Personnel in the Houston office include: A. K. Brown, division sales manager; Philip Renn, district manager for Gulf Coast; and B. H. Burks, sales engineer.

We have "salesmen" on 3 continents... *our customers*

In Europe, South America and throughout North America . . . wherever refiners require unqualified results in the treatment of petroleum emulsions . . . Howe-Baker custom built installations will be found meeting the most exacting demands. Because of this consistent performance Howe-Baker customers become our best salesmen. Refer your desalting problems to us.

SPECIALISTS IN PETROLEUM EMULSIONS

HOWE-BAKER CORPORATION
ESPERSON BUILDING HOUSTON, TEXAS

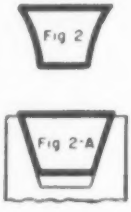


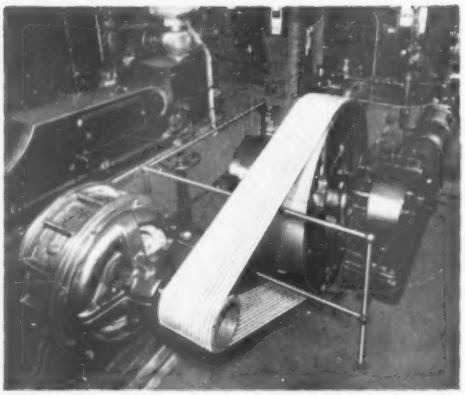
To see how the CONCAVE SIDE lengthens Belt Life...

—take any *straight-sided* V-Belt (Fig. 1). Bend it—as if it were going around a pulley. The sides will at once *bulge out* (Fig. 1-A)—and this causes *extra wear* where the bulge is greatest. (See arrows.)

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

You will see the precisely engineered CONCAVE SIDES fill out to an exact fit in the sheave-groove (Fig. 2-A). The sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means longer belt *life* and *lower* belt *costs* for you.





Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE Sides—the Gates Vulco Rope!

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

CS-5311

V-Belts—Hose
Molded Rubber Goods
for industry
World's Largest Maker
of V-Belts

Gates® VULCO ROPE DRIVES

THE GATES RUBBER COMPANY • DENVER, U.S.A.

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Check here FOR NEW EQUIPMENT or LITERATURE

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Your inquiry will be forwarded to the supplier within 48 hours (or less) from the time we receive it.

To The Oil and Gas Journal: Please send me further information, without obligation, on items of New Equipment or Bulletins I have checked (✓) from your issue of **December 28, 1953**

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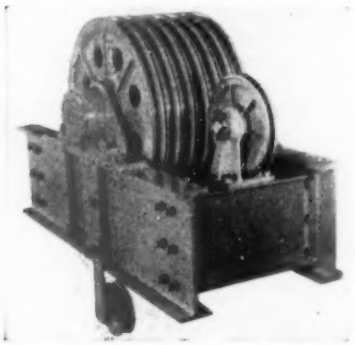
DIGEST OF NEW EQUIPMENT

IT'S NEW ✓ CHECK IT

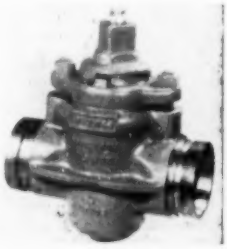
by Dan B. Miller

1 IDEAL TYPE F CROWN BLOCK is companion equipment to the 450-ton Type F Universal hook-block, and Universal traveling block. The new crown block is rated at 525 tons, based on a suspended load of 450 tons and dead-line load of 75 tons. Designated as Type 754-F, it has seven 54 - in. - diameter sheaves, and is suitable for all deep drilling. Each sheave is individually mounted on a Timken double-row tapered bearing. The sheaves are mounted in line and held in fixed lateral position, no spacers being required. The sheave grooves are flame-hardened, with wide flare. Sheaves of the crown block are size-matched with those of the mating hook-block or traveling block, permitting maximum use of derrick space without flare of the lines. They are normally furnished for 1⅜-in. line, but can be grooved for 1½-in. line if preferred. The Type F crown block has a narrow over-all design, providing a greater proportionate strength-to-weight ratio. All parts and fittings are securely locked. A hanger-type catline sheave attachment, furnished with the crown block, may be mounted in any one of four positions below the main side members. A sand-line sheave attachment is available as optional equipment. *The National Supply Co.*



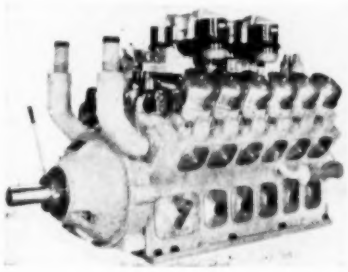
IT'S NEW ✓ CHECK IT

2 NEW GROOVED-END NORDSTROM SEMISTEEL VALVE. A new grooved-end version of its standard two-bolt yoke-type Nordstrom semisteel lubricated plug valves makes it possible to connect valves to steel pipe with grooved-end couplings. With this method, a tight, permanent connection can be made in a matter of minutes and lines may be dismantled as often as necessary without damage to the pipe or grooved couplings. This method also eliminates the need for level ditching because a deflection of several degrees at every joint allows the lines to follow the uneven contours of the ground. This flexible connection also offsets pipe vibration and overcomes the problem of pipe expansion and contraction. In petroleum production the new valve is recommended for use on tank batteries, flow lines, gathering lines, separator hookups, water - disposal piping, water-flooding lines; manifolds, and to connect service pipe to drilling rigs. In pipe lines, it is suitable for tank connections, tank farms, manifold branch lines, main lines, and pump stations; in refineries, for stock lines, transfer lines, tank connections, circulating cooling systems, and fire protection. The new valve is wrench-operated and has a pressure rating of 175 psi. It is produced in 2, 2½, 3, and 4-in. sizes. *Rockwell Manufacturing Co.*



IT'S NEW ✓ CHECK IT

3 POWERFUL V-12 VALVE-IN-HEAD, INTERNAL-COMBUSTION ENGINE for use in the petroleum industry and wherever heavy sustained loads are encountered, has 4,000 cu. in. piston displacement and will be known as the Le Roi L4000. The L4000 will develop 635 hp. at 1,200 r.p.m. with accessories. Burning low-cost natural gas, the L4000 is especially designed for operations where dependable power must be delivered at minimum operating and maintenance costs. The L4000 can also be equipped for burning liquefied petroleum gas, sewer gas, or gasoline. Like all Le Roi units, the L4000 is equipped with removable wet-type cylinder sleeves. Indi-



✓ KEEP INFORMED ✓ SAVE TIME ✓ TEAR OUT CARD ✓ CHECK IT ✓ MAIL IT

This Digest of New Equipment offers you a quick resume of important features of new or improved products and trade literature and the opportunity to obtain complete information on each subject by use of the convenient "CHECK IT - MAIL IT" service card.

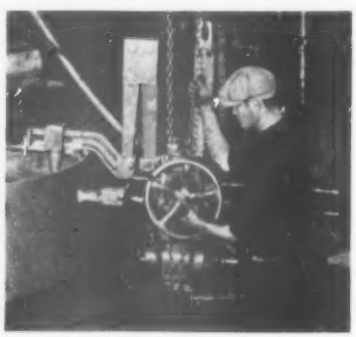
vidual cylinder heads are removable without disrupting intake and exhaust manifolds. *Le Roi Co.*

IT'S NEW CHECK IT

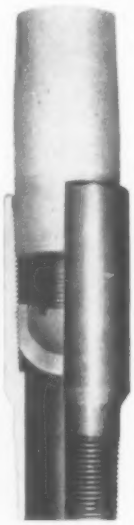
4 NEW AUGER DRILL. Specially designed and highly engineered Model H-1 drill meets the requirements of the greatest number of seismo drilling problems encountered. Versatility is keynote of rig. It can drill with auger, drill pipe, or casing. In areas where water is scarce or where gravel or blind holes are encountered, the auger drill solves the water and mud problems since one crew member, water truck, mud, and mud additives are eliminated. A feature of the auger's use is the absence of water, which in turn, means that no washing out of unconsolidated gravel formations will occur. Consequently, the wall is undisturbed, lessening the possibility of the hole caving. Another feature is the lack of maintenance problems through the elimination of one truck and its equipment and the use of a hydraulic drive for the rotary table and draw works. The H-1 has proven its stamina in rigid, on-the-job testing in areas in Texas such as: Columbus, Cuero, Mission, Canadian; the Williston basin of North Dakota, and at Artesia, N. M. Only a two-man crew is required to operate the H-1 at peak efficiency since no pipe wrenches, slips, hoisting plug, or special tools are required in drilling or coming out of the hole. *Casey Machine & Supply Co.*

IT'S NEW CHECK IT

5 NEW PORTABLE AUTOMATIC DRILLING MACHINE can work from any position around large, unwieldly steel beams, girders, and weldments. The machine is operated by push button and automatically drills holes up to 2 in. in diameter at right angles to the work surface. Suspended from a crane or other overhead structure, the machine is quickly and easily moved over and around cumbersome work pieces too bulky to be handled on conventional equipment. The drill penetrates steel on a line perpendicular to the surface or surface tangent. The operator simply moves the drill head over a punch mark in the steel surface and locates the drill point by means of a hand wheel. The drill head automatically clamps to the steel structure and the drilling of the hole starts. After the hole is drilled, the drill withdraws automatically. The operator then moves the drill over to the next center-punched mark. *Artos Engineering Co.*



IT'S NEW CHECK IT



6 GULF FLO-STARTER is designed for use with well settings to eliminate swabbing when wells are first put on production. It may also be used to make simple formation tests when used in combination with regular production packers. It serves to surge well production on initial flow, thus breaking down tight, muddedoff, and low porosity formations. The tool is composed of a housing containing a frangible metal disk sealed and tested to withstand 10,000 psi. bottom-hole pressure. In operation the Flo-Starter is made up in the production tubing string above the production packer (tubing above the Flo-Starter may be run dry or with water cushion), production string is then run into well, packer set, and well head connections, valve, and flow lines installed. A small bar is then dropped through the tubing string shattering the metal disk and thus releasing the formation production to the tubing string. *Gulf Tool Co., Inc.*

IT'S NEW CHECK IT

7 NEW EVERGREEN NEOPRENE OLIVE-DRAB CLOTHING. This tough, yet comfortable, flexible, and cool clothing, which is coated inside and outside with neoprene after seams are sewn so that stitches are protected, will not snag, peel, stick, crack, or wear out easily. It is ideal for use where protection from rain, salt water, acid, paint, grease, oil, gasoline, or alkali is required. Extra-large patterns are used so that a comfortable fit is assured and buttons, button holes, and pants crotches are reinforced for longer life. The new clothing can be cleaned simply by rinsing in a petroleum solvent cleaner, shaking and hanging out for an hour or two. *M. L. Snyder & Son.*

IT'S NEW CHECK IT

8 PAYLOADER PERFORMANCE IMPROVED. Performance of the Hough Model HM Payloader tractor-shovel has been considerably improved by the addition of

ANOTHER OUTSTANDING NAME ADDED TO THE WILSON SUPPLY COMPANY LINE OF PROVEN OIL FIELD SUPPLIES AND EQUIPMENT—

FAIRBANKS-MORSE

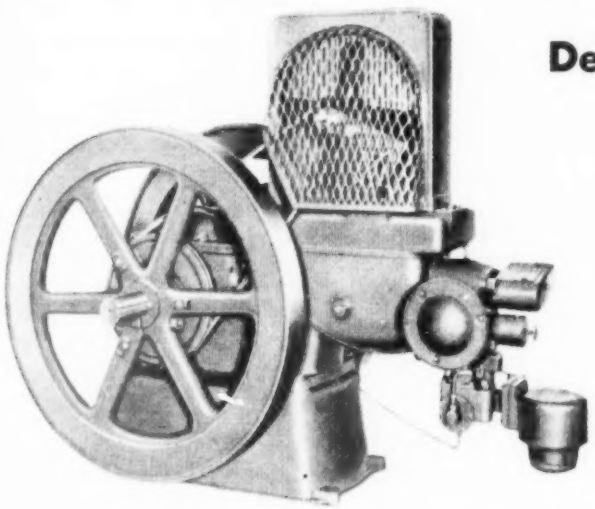
a name worth remembering when you want the best

- Engines
- Rotary Pumps
- Diesel Engines
- Electric Motors

For more than 30 years The Wilson Supply Company has served the Oil Industry in the Gulf Coast area with equipment and supplies from the leading manufacturers of the country. Oil field products of Fairbanks, Morse & Company are favorably known throughout the Industry, and are now available through all 16 Stores of Wilson Supply Co.

THE ZC ENGINE

Designed for Better Pumping SERVICE



Here is the best Engine on the market for pumping your well. Features of the ZC slow speed-horizontal heavy duty Engine are:

- VAPOR COOLING
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- EXTRA HEAVY FLYWHEELS
- SELF OILING—FULLY ENCLOSED
- EASY STARTING
- GASOLINE CARBURETOR
- GREASELESS CLUTCH WITH BUILT IN SHIFTER

ZC Engine operators have learned by experience to fully appreciate the many desirable features of these engines. They have discovered that the "ZC" will do a better job at less cost than many higher priced pumping engines. They know about the trouble-free cooling system—about the easy starting—even on the coldest mornings, and about the low oil consumption and fuel economy.

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OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

a hydraulic torque converter. This improvement is incorporated in the gas and diesel - engine models. This converter is a three-element-type which multiplies the torque output of the engine in direct proportion to the load requirements. In conjunction with the four-speed, full reversing transmission, it provides a much smoother tractor-shovel drive than has previously been available. The torque converter, by greatly reducing the amount of clutching and gear-shifting needed, also materially reduces the amount of effort and concentration previously required of the driver. This drive acts as a cushion for the entire power train, thus protecting these components against load shocks, reducing maintenance and prolonging the life of the unit. *The Frank G. Hough Co.*

IT'S NEW CHECK IT

9 A NEW HYDRAULIC HOLD-DOWN TOOL. Used in selective acidizing through perforations below a hook-wall packer or anchor packer, in high-pressure water or gas injection, squeeze cementing, and formation fracturing, the new hold-down tool affords a variety of approaches to completion problems. Tool can be installed at any point in operating string and set above casing shoe to hold down any type of open hole or casing packer against pressure from beneath. It is built around eight large-surface, case-hardened, hydraulic slips actuated against the casing by tubing pressure. These slips take firm grip against the hardest pipe. Wide distribution of radial pressure prevents damage to walls. Use of a hydraulic (venturi) principle which reverses the effect of internal pressure buildup during travel, prevents wear on slips. A retracting force is created by a frangible orifice disk in the floating sleeve. This disk can be destroyed with a swab or sinker bar to arrive at full tubing diameter. *Sweet Oil Well Equipment, Inc.*

IT'S NEW CHECK IT

10 IMPROVED INTAKE - EXHAUST SILENCERS. Two new series of silencers for quieting noise produced by air compressors, blowers, vacuum pumps, and other machines expelling high-velocity air to atmosphere are known as the series CA and LCA. They are designed for operation under moisture-free air conditions and for temperatures up to 200° F. Both series are acoustic-type silencers employing straight-through acoustically transparent perforated tubes surrounded by a deep layer of special, highly efficient, sound absorbing material and, therefore, featuring minimum restriction to air flow. Special sound absorbing material can be used for operations of considerably higher temperatures than the standard of 200° F. The CA series is available in pipe sizes up to 6-in. whereas the LC series is available in sizes larger than 6-in. *Burgess-Manning Co.*

IT'S NEW CHECK IT

11 NUMBER 700SB SNAKE-BITE KIT. The kit contains the Saunders suction syringe for the extraction of venom, along with a constricting band, lancet, ammonia inhalants, iodine swabs, and adhesive bandages; all of the items necessary to render fast and effective suction treatment for snake bite. The suction syringe and kit are made of Tenite plastic for durability, and clear plastic syringe adapters of various sizes permit constant inspection of the fluid being extracted. The suction syringe is made with surgical precision, and permits controlled suction and ease of operation by the victim alone if necessary. The snake-bite kit requires three unit spaces in unit-type kits. Also, it may be carried on the person in single or double-belt carrying pouches of various grades. *Medical Supply Co.*

IT'S NEW CHECK IT

12 ALL - WEATHER POWERMASTIC HEATER. Heavy asphaltum and mastic materials may be sprayed smoothly, rapidly, and virtually unaffected by cold weather. The portable Powermastic heater, weighing less than 40 lb., is placed in the material line approximately 25 ft. back of the gun, to provide the maximum mobility for the operator. The material is pumped through the efficient and maintenance - free heater, reaching the gun at a viscosity lower than could be expected on a summer day. The viscosity reduction permits application with lowered air pressure, which eliminates gun blast and overspray and produces a smoother, more uniform finish. Heated material may be applied almost twice as rapidly with no tendency to sag. Drying time, quality, and speed are improved and air volume requirements are reduced. The Powermastic 600-CX is a heavy-duty unit with approved explosion-proof construction, designed to operate at an average fluid pressure of approximately 600 psi. Volume up to 100 gal. per hour may be sprayed with effective results. *The Spee-Flo Co.*

IT'S NEW CHECK IT

TRADE LITERATURE

13 PROTECTION WITH PARLON. The unusual versatility of these coatings as demonstrated by the many and varied case histories may suggest new ways for you to employ such coatings to your own work. Technical information in this booklet is limited to a few basic facts that might be of interest to maintenance personnel at all levels. However, detailed technical data on Parlon paints and finishing assistance are available upon request. *Hercules Powder Co.*

14 WIRE ROPE—USE AND ABUSE. The pamphlet lists some of the common abuses of wire rope and how to prevent them. Illustrated with photographs, technical drawings, and diagrams, this two-color booklet contains sections dealing with handling, installing, storing, and lubricating, as well as suggestions for correct methods of operation. *E. H. Edwards Co.*

15 OXYGEN - INDEX OF COMBUSTION PROCESSES is a new bulletin which graphically illustrates and explains how too much or too little air can have costly effects in combustion processes. It points out that by using oxygen itself as the criterion to proper combustion, greater over-all process efficiency and more profits can be realized. The bulletin shows how oxygen in flue gases will indicate almost exactly the same excess air factor for any fuel from coke to natural gas, even when the fuels are in combinations of two or more. *Arnold O. Beckman, Inc.*

16 CORROSION - RESISTING PROPERTIES OF THE AUSTENITIC CHROMIUM-NICKLE STAINLESS STEELS. Bulletin A-49, a 32-page booklet, has 18 tables showing the results of tests on numerous austenitic stainless steels in various solutions, acid, neutral, and alkaline. The publication covers: the mechanism of corrosion resistance in stainless steels; factors affecting their corrosion; behavior in various corrosive environments; and the preferred practice in construction and use of stainless steels. *International Nickel Co., Inc.*

17 ESCO SPUNCAST. The products and application of centrifugally cast heavy-wall cylindrical stock, tubes, and IPS pipe manufactured are graphically described in a new booklet. Esco Spuncast is essentially a new raw material. It is a form for stainless and high-alloy steels and other metals which offers new possibilities for reducing production costs of hollow circular or cylindrically shaped parts and products. The booklet points out that true centrifugal castings are pressure formed by the introduction of molten metal into rotating refractory faced molds. These are rotating at speeds which develop centrifugal forces many times that of gravity, thereby distributing and holding the metal against the mold wall until solidified. *Electric Steel Foundry Co.*

18 TRAY - TYPE DEAERATING HEATERS. An introductory section of the bulletin explains the principles of successful deaeration and the essential elements of a deaerating heater. The features of Tray - Type and Spray-Tray-Type heaters are described in tabular form for greatest clarity, and illustrated by detailed drawings with identification of all parts. Included in the bulletin are also flow diagrams and photographs of typical heater installations. *Graver Water Conditioning Co.*

19 CABLE - TOOL, TOOL AND DRILLING MANUAL BY CYCLONE has been designed to serve both as a catalog for cable drilling tools, and as an operations manual for the driller in the field. An outstanding feature of the book is a streamlined consolidated tool - string specifications table which enables the driller to choose the proper string of tools, or any individual drilling tool for any size hole. Bound in a stain-resistant and grease-proof cellucoated cover, the manual illustrates and gives use information and tips on all necessary and popular cable drilling tools. *The Sanderson-Cyclone Drill Co.*

20 PIPE DATA CARD. A new data card is designed to be of assistance to those involved in the selection, application, and installation of carbon, alloy, and stainless-steel pipe. Known as TDC 138 A, the data card contains information on dimensions, weights, specifications, grades, and analyses of seamless and welded carbon, alloy, and stainless-steel pipe. It presents pertinent data on six pipe size schedules and complete reference data to steels covered by A.S.T.M. and A.S.M.E. piping specifications. *Tubular Products Division, The Babcock & Wilcox Co.*

21 AIR HEATER BULLETIN. Printed in seven colors, the new six-page bulletin describes in both print and detailed flow diagrams, not only the operation of the Peabody Air Heater, but typical applications as well. The cylindrical furnace air heater is being widely used throughout the process industries. *Peabody Engineering Corp.*

22 NEW OIL-WELL SERVICING WINCH is a new specification sheet for the Hyster D4N oil-well servicing winch. The D4N winch is specifically designed for servicing shallow oil and gas wells. The winch drum has a capacity of 870 ft. of ¾-in. line to 3,480 ft. of ⅜-in. line. A drum divider flange facilitates temporary line storage. Two output ranges, high-speed or heavy-duty, are obtained by changing gears in the field. All the controls can be operated easily from the ground. Spec sheets contain complete information, including conversion for seat-tank and fender - tank - type tractors. *Hyster Co.*

23 VERSATILE LIQUID - LEVEL AND AIR-FLOW DETECTOR. Application ideas, installation tips, and suggested circuits for utilizing the recently announced Detect-A-Flo unit, a versatile device that controls or detects both liquid level and air flow, are presented in a new 16-page illustrated booklet. In addition to a variety of application information, the booklet also discusses the principle of operation of this device, which has no moving parts, is hermetically sealed, and is installed directly in the tank or air stream being monitored. Also given are detailed specifications, including response curves, on the performance, operation, and electrical characteristics of the unit. *Fenwal, Inc.*

24 WELDING END SPECIFICATIONS. Socket welding end dimensions are given for valves 2 in. and smaller. Butt welding end dimensions are given for pipe sizes from 2½ to 16-in. Included in the bulletin are four diagrams indicating the standard preparation of valve butt welding ends. *Edward Valves, Inc.*

25 B.S.&B. HORIZONTAL TREATER, MODEL HGT. Written in nontechnical language and fully illustrated with photographs, charts, and four-color diagrammatic drawings, the 20-page catalog describes 12 important features of the unit, lists capacities and specifications, shows how to size treater, traces flow through the unit, and gives a case history illustration of a particularly tough treating problem that was solved with this unit. *Black, Sivalls & Bryson, Inc.*

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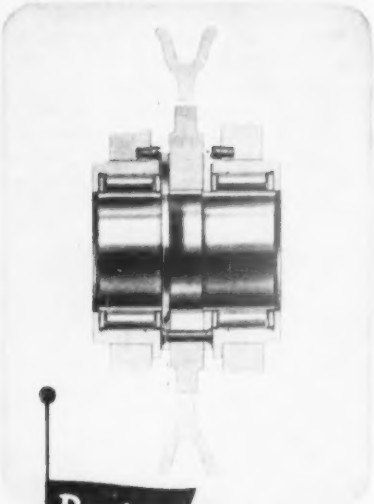

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DUAL BEARINGS

. . . for greater bearing life and longer wire line life. With Regan exclusive, rotating inner race Dual Bearings, each sheave has an integral rotating pin which distributes bearing wear around the entire area of the pin. Bearings on *each side* of the rotating pin prevent oscillation of the sheave. This construction permits use of smaller bearings which enables the block to operate at greater speed with less friction and minimum wire line slippage. Exclusive Regan long-lived Dual Bearings are embodied in all Regan Crown and Traveling Blocks.

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Quality - Wrought on the Forge of Experience

Pipe-Line Patrol

. . . Report on Construction

Action Along The Mississippi Delta

A LAY barge of Brown & Root, Inc., operating in shallow water, was equipped to provide for a series of operations including welding, concreting of field joints, and lowering in, for construction in shallow water. This work was carried on in connection with the program of Southern Natural Gas Co. in the marshes, swamps, and offshore areas in the Mississippi River Delta south of New Orleans.

Coated and concrete-jacketed pipe was delivered by towed barges to the lay barge. After welding and X-ray radiographic inspection, the short bare ends of the pipe were covered with cement so that they were flush with the main concrete coating.

The provisions for adequate covering of field joints and the practices for lowering in, so that the concrete would not be cracked, will be described in articles by P. H. Timothy, special projects engineer, Southern Natural Gas Co., in articles which will appear in early issues of The Oil and Gas Journal. The Southern Natural expansion program was described in the November 2, 1953, issue, page 58.

Under Way, Contracted, and Planned . . .

PIPE-LINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipe-line companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the company name.

Crude-Oil Pipe Lines

• **California - Oregon Pipe Line System**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

• **Cities Service Pipe Line Co.**—60 miles, 12-in., planned, Houston to Sour Lake, Tex.

• **Gulf Refining Co.**—55 miles, 12-in., planned, Bay Marchand to Plaquemines, La.

Gulf Refining Co.—63 miles, 8-10-in., under way, Lea County, New Mexico, to Anderson and Denton fields, 1-54.

• **Magnolia Pipe Line Co.**—29 miles, 8-in., planned, Midland County, Texas area.

Magnolia Pipe Line Co.—56 miles, 8-in., contracted, Seminole, Tex., to Gladiola Junction, N. M. Completion date 2-54.

• **Michi, Inc.**—10-in., planned, Highland, Ind. to Kalamazoo, Alma, and Elsie, Mich.

• **Pasotex Pipe Line Co.**—146 miles, 10-in., planned, Snyder to Wink, Tex. 2-1-54.

Phillips Pipe Line Co.—18 miles, under way, gathering lines, northeast area of Andrews County, Texas.

• **Progress Pacific Pipeline Co.**—1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles, Harbor, Calif.

• **Roosevelt Oil & Refining Corp.**—22

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We deliver on schedule.

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PIPELINE CONTRACTORS

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miles, 4 and 6-in., planned St. Helen to Norwich, Mich.

• **Sinclair Pipe Line Co.**—20 miles, 12-16-in., planned, Monee to Blue Island, Ill. Completion date 4-54.

Texas New Mexico Pipe Line Co.—52 miles, 10-in., under way, Dawson County to Basin System. McVean & Barlow.

Texas Pipe Line Co.—34 miles, 6-in., under way, Sour Lake to Port Arthur, Tex. Houston Contracting.

45 miles, 8-10-in., under way, between Erath and Bayou Sale stations. Houston Contracting Co.

65 miles, 4-6-8-12-in., under way, South Louisiana. Panama-Williams.

Golden Meadow to Houma, La. Panama-Williams.

Gathering lines in Leeville, Bay De Chene and Golden Meadow pools. Panama-Williams.

• **West Coast Pipeline Co.**—960 miles, 20-22-in., planned. Wink, Tex., to Norwalk, Calif.

Products Pipe Lines

Augusta Pipe Line Co.—43 miles, 8-in., under way, from Arkansas City to Augusta, Kans. Ray L. Smith & Son, Inc.

Badger Pipe Line Co.—215 miles, 8-10-12-in., begin Spring '54, East Chicago, Ind., to Madison, Wis. (Joint project of Cities Service Oil Co., Sinclair Pipe Line Co., Pure Oil Co., and The Texas Co.)

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Frontier Ref. Co.—6-in., planned, Cheyenne, Wyo., to North Platte, Neb.

• **Great Lakes Pipe Line Co.**—Proposed, extension 130 miles, Nebraska City to Grand Island, Neb.

Harbor Products Systems—86 miles, 16-in., under way, Woodbury Junction, Philadelphia to Trembley Point, N. J. Construction Service Co. and H. C. Price Co. (Joint ownership of Sinclair Pipe Line Co., Gulf Refining Co., and Texas Pipe Line Co.) Completion date 1-54.

• **International Pipe Line, Inc.**—132 miles, 8-in., proposed, Wrenshall to Minneapolis, Minn.

Oklahoma Mississippi River Products Line, Inc.—475 miles, 12-in., under way, Duncan, Okla., to West Memphis, Ark. Ford, Bacon & Davis Const. Corp.

Under way, White River to Allen, Okla. River Const. Co. Completion date 6-30-54.

Under way, Allen to Duncan, Okla. River Constr. Corp. Completion date 6-30-54.

• **Phillips Petroleum Co.**—54 miles, 6-in., planned, Goldsmith to Borger, Tex.

52 miles, 10-in., planned, Shell's Brookshire system to Sweeny, Tex.

• **Triangle Pipe Line Co.**—560 miles, proposed, Arkansas City, Ark., to Covington, Ky., and Nashville, Tenn.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles, 8-in., under way, Haines northward through British Columbia and Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Const. Co. Completion date 9-55.

• **United States Pipe Line Co.**—1,799 miles, 22-26-in., proposed, Beaumont, Tex., to Newark, N. J.

Beaumont, Tex., to Memphis, Tenn.

Memphis, Tenn., to Louisville, Ky.

Louisville, Ky., to Newark, N. J.

Laterals to Paducah and Lexington, Ky.

Williston Basin Pipe Line Co.—250 miles, 8-in., under way, Laurel-Billings, Mont., refineries to Glendive, Mont.

Wolverine Pipe Line System—200 miles, 14-in., under way, Chicago-Toledo-Detroit. (Joint ownership of Shell, Texas, and Cities Service.) Anderson Bros. and Midwestern Constructors, Inc. Completion date 1-54.

East Chicago, Ind., to Kalamazoo River. Midwestern Constructors, Inc.

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140,000' 8⅝" O.D. .322 Wall, 28.55# Lapweld.

All machine cleaned, straightened, 20' single random lengths, ends beveled. Used good condition #2 grade suitable low pressure pipe line service, structural columns or piling. Priced 85¢ per foot f.o.b. cars or trucks Grandview, Mo. or Welda, Ka.—prompt shipment—subject prior sale. Substantial quantities used 8" couplings for this pipe available at low price.

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Nozzle sizes from ¼" to 24" — ASTM A234

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Nominal pipe sizes 1" to 24" — ASA B16.9 ASTM A234

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Yellowstone Pipe Line Co.—(Continental Oil Co., Interstate Oil Pipe Line Co., Union Oil Co., and H. Earl Clack interest) 540 miles, 10-in., contracted, Billings, Mont., to Spokane, Wash. 9-54.

Billings to Bozeman, Mont. Ross and Powers.

Bozeman to Helena and on to Clinton, Mont. Associated Pipe Line Contractors, Inc.

Clinton to Perma, Mont. Associated Pipe Line Contractors, Inc.

Clinton to Perma, Mont. Eastern Pipe Line Fields Service Co.

Perma, Mont., to Murray, Idaho. Eastern Pipe Line Field Service Co.

Murray, Idaho to Spokane, Wash. Engrs. Limited Pipe Line Co.

Natural-Gas Pipe Lines

• **America-Louisiana Pipe Line Co.**—1,000 miles, 30-in., proposed, Lowry, La., to Detroit, Mich.

Arkansas-Louisiana Gas Co.—107 miles, 8-24-in., proposed, Arkansas, Louisiana, and Texas.

• **Arkansas-Missouri Power Co.** — 140 miles, 2 to 10-in., planned, St. Francis River, Clay County, Arkansas, to near Campbell, Mo.

• **Associated Natural Gas Co.**—88 miles, proposed, Missouri.

• **Atlantic Seaboard and Virginia Gas** Transmission.—116 miles, 26-in., proposed, loops along Cobb, W. Va., to near Baltimore, Md.

Buzzards Bay Gas Co.—28 miles, 8-in., contracted, Hyannis, Mass., to Bourne Bridge, Mass. Hallen Co., Inc.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

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FOR: • OIL • MUD • ACID • SALT WATER • WATER FLOODING

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SKID OR TRAILER MOUNTED

REPLACES 4" x 6" FOR MOST PURPOSES

Piston	Stroke	BPH	PSI	HP	Wt. Lbs.	Plunger Load
2"	5	35	900	15	700	2500#
2½"	5	56	520	15	700	
3"	5	83	350	15	700	
3½"	5	115	255	15	700	

• HERRINGBONE GEARS
• REDUCING LINERS
• POT TYPE FLUID END
• NO ROD OVERLAP
• ANTI-FRICTION BEARINGS
• CONTROLLED LUBRICATION

SAVE $1,000 BY USING 3½"X5" INSTEAD OF 4"X6"

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▸ United Supply Mfg. Co. ▸ Walker-Neer Co. ▸ D. T. O'Conner Co.
▸ Wheatley Equipment & Supply, Limited

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TULSA 6, OKLAHOMA

• **Chicago District Pipe Line Co.**—31 miles, 24-30-in., proposed, East bank of Des Plaines River southwesterly to near Hodgkins, Ill., on through Cook County to Will County, Illinois.

• **Cities Service Gas Co.**—18 miles, 16-in., Lawrence and Newton counties, Missouri.

69 miles, 20-16-in., planned, Cleveland, McClain, and Garvin counties, Oklahoma.

• **City of Fayette, Ala.**—20 miles, 5-in., proposed, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Ala.

City of Dallas, Ga.—8 and 4½-in., distribution system. Engineering & Const. Co. 1954.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., proposed, Green River, Wyo., to Denver, Colo. 1954.

49 miles, 20-in., proposed, Morton County, Kansas, to near Hooker, Okla.

Colorado Interstate Gas Co.—70 miles, 20-4-in., under way, gas-gathering system in Kansas. Engineering & Const. Co. 1-1-54.

243 miles, 4 to 20-in., under way, Colorado, Oklahoma, Texas, and Kansas. Engineering Const. and Z. J. Graham.

• **Cumberland and Allegheny Gas Co.**—31 miles, 12-in., proposed, Garrett County, Md., to Keyser, W. Va.

East Tennessee Natural Gas Co.—96 miles, 16-in., under way, Knoxville, Tenn., to Kent line. Engineering & Const. Co. 1-1-54.

54 miles, 4-12-in., under way, laterals off main line from Knoxville, Tenn., to Kent line. Engineering & Const. Co. 1-1-54.

• **El Paso Natural Gas Co.**—1,178 miles, proposed, Permian basin, New Mexico, Texas and Colorado.

El Paso Natural Gas Co.—771 miles, 30-in., under way, Plains, Tex., to Kingman, Ariz.

Section 1—Under way, Plains, Tex., to Corona, N. M. Oklahoma Const. Co.

Section 2—Under way, Corona to Suwanee, N. M. R. H. Fulton.

Section 3—Under way, Suwanee to Gallup, N. M. R. H. Fulton.

Section 4-5—Under way, edge to Navajo Reservation east to Flagstaff on to Kingman, Ariz. Western Pipe Line Const., Inc. Completion date 2-54.

Under way, across Navajo Reservation connecting sections 3, 4, and 5. El Paso Co. crews.

Under way, Spraberry fields, El Paso Co. crews.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Gulf Interstate Gas Co.—860 miles, 30-in., under way. Acadia Parish, La., to Boyd County, Ky. H. C. Price and Houston Contracting. 11-54.

Under way, Rayne, La., to Kincade, Tenn. Houston Contr. Completion date Spring 1954.

Under way, Gordonsburg, Tenn., to Catlettsburg, Ky. H. C. Price Co.

230 miles, gathering lines, under way. Associated Pipe Line Contractors, Anderson Bros., Williams Bros.

329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.

• **Home Gas Co.**—32 miles, 12-in., planned, Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hansock to Sanford, N. M.

• **Interstate Power Co.**—26 miles, 8-in., proposed, from Nat. Gas P. L. Co. America line near Hooppole, Ill., to Clinton, Iowa.

• **Kansas-Nebraska Natural Gas Co.**—41 miles, 10-12-in., proposed, Kansas and Nebraska.

41 miles, proposed, Albion, Arcadia, and Broken Bow, Neb.

• **Lone Star Gas Co.**—100 miles, proposed, storage fields to the Dallas-Fort Worth area.

35 miles, 12-in., proposed, southeastern Schleicher County.

Lone Star Gas Co.—44 miles, 12-in., under way, Red Springs, Woods County to Sulphur Springs area, Hopkins County, Texas.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., proposed, Doddridge, Wetzel and Marshall counties, West Virginia.

• **Mississippi River Fuel Corp.**—109 miles, 10-18-in., planned, laterals in Woodlawn and Waskom gas fields, Texas.

Missouri Central Gas Co.—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo.

• **Montana Power Co.**—52 miles, 16-in., planned, Canada-Montana border to Cut Bank, Mont.

• **Morganfield Natural Gas Co.**—31 miles, 4-6-in., planned, through Sturgis, Providence, Clay, Diamond, Wheatcroft, and Sullivan, Ky.

• **Natural Gas Producer, ic.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

Nevada Natural Gas Pipe Line Co.—114 miles, 10¾-in., under way, Topock, Ariz., to Las Vegas, Nev. R. H. Fulton. Completion date 1-1-54.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **Northeastern Gas Transmission Co.**—22 miles, 8-in., planned, Upton, Mass., to Pawtucket, R. I.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

• **Northern Natural Gas Co.**—458 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska, Iowa, and Minnesota to connect with Permian Basin System.

475 miles, proposed branch lines to Iowa, Nebraska, Minnesota and South Dakota.

• **Northwest Alabama Gas District**—40 miles, 9-in., proposed, Southern Natural's line through Windfield to Haleyville, Ala.

• **Northwest Natural Gas Co.**—750 miles, planned, Washington, Oregon, and Idaho.

24-in., Eastport, Idaho, to Monroe, Wash.

18-in., Monroe to International boundary near Lynden, Wash.

22-in., Monroe to near Seattle, Wash.

20-in., Seattle to Portland, Ore.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking and Fairfield counties, Ohio.

• **Pacific Gas & Electric Co.**—50 miles, 12-16-20-in., planned, Fresno to Merced, Calif.

(Section 2) 20-in., Holm to Topock-Milpitas line.

(Section 3) 12-in., parallel existing Madera-Livingston line, planned. Napa Wye to Shellville; Cotati to Santa Rosa, Calif.

129 miles, 31-in., proposed, main-line loops along Topock, Ariz., to Milpitas, Calif. Completion date 11-54.

Pacific Gas & Electric Co.—88 miles, 34-in., under way, portions of 34-in. Topock-Milpitas pipe line. Completion date 4-15-54.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

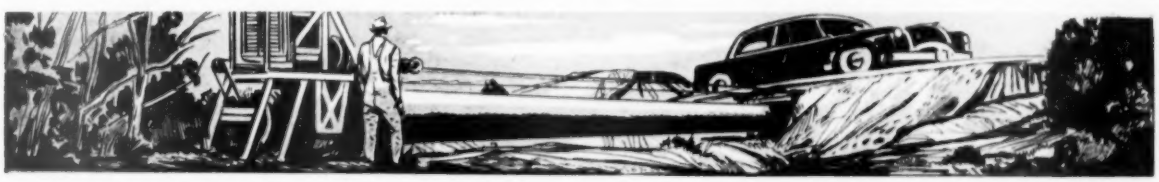
380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

Permian Basin Pipeline Co.—280 miles, 16-24-26-30-in., under way, West Texas and New Mexico. R. H. Fulton & Co.

• **Rockland Light & Power Co.**—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

• **Shenandoah Gas Co.**—39 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va.

• **South Georgia Natural Gas Co.**—339 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to



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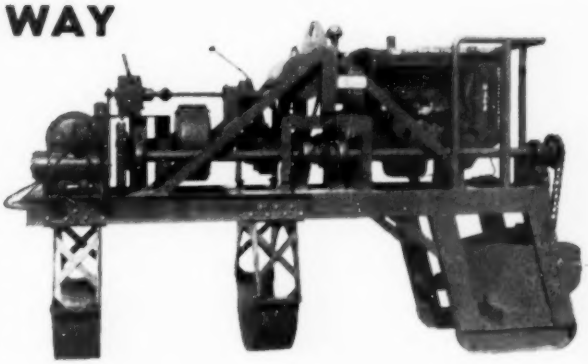

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Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee.

Southern California Gas Co., and Southern Counties Gas Co.—73 miles, 30-in., under way, loops on main line from Blythe to Los Angeles. River Const. Co. 1-54.

Southern Natural Gas Co.—1,235 miles, 24 to 4½-in., under way, Louisiana, Mississippi, Albama, and Georgia, and South Carolina. Houston Contracting, Latex and H. C. Price. Fall 1953.

Gwinville to Pickens. Completion in 1954.

Gwinville, Miss., to Ellerslie, Ga. Completion in 1954.

• **Southwest Gas Corp., Ltd.**—26 miles, proposed, from P.G.&E. line to Victorville, Calif.

• **Tennessee Gas Transmission Co.**—571 miles, 30-in., planned, Kinder, La., to Portland, Tenn.

67 miles, 30-in., planned, loops in Texas and Louisiana.

63 miles, 26-in., planned, loops in Ohio and Pennsylvania.

58 miles, 20-in., planned, Louisiana Gulf Coast to Station No. 507 near Kinder, La.

100 miles, laterals in Texas.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U. S.-Canadian border Hamburg station near St. Catherines.

Undetermined, 24-in., planned, Mercer, Pa., to New York City.

• **Texas Gas Transmission Corp.**—48 miles, 26-in., planned, loops from Memphis to Slaughters, Ky.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va.

• **Transcontinental Gas Pipe Line Corp.**—533 miles, 30-36-in., looping along Texas-New York line.

• **Trans-Northwest Gas, Inc.**—246 miles, proposed, International Boundary near Osoyoos, B. C., to Washington and Idaho.

275 miles, branch lines.

• **United Gas Fuel Co., and Central Kentucky Natural Gas Co.**—92 miles proposed, Gulf Interstate system, Boyd County, Ky., to Putnam County, West Virginia.

• **United Fuel Gas Co.**—50 miles, 20-24-in., proposed, Wood County to Lanham, W. Va. Spring 1954.

32 miles, 24-in., proposed, near Ripley, W. Va., to Lanham station, Putnam County, W. Va.

60 miles, 30-in., proposed, Lanham in Kanawha County, West Virginia, to Gulf Interstate line in Boyd County, Kentucky.

United Gas Pipe Line Co.—44 miles, 20-in., under way, Lirette field to Harvey, La. Brown & Root.

• **United Natural Gas Co.**—50 miles, 12-in., planned, Elk County to Jefferson County, Pennsylvania.

• **Utah Natural Gas Co.**—103 miles, 16-18-in., proposed, Clear Creek field near Price to Salt Lake City, Utah.

18-in., Clear Creek to Provo, Utah.

16-in., Provo to Salt Lake City, Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Warren Petroleum Co.—54 miles, 4-30-in., planned, Lea County, New Mexico.

25 miles, 3 to 20-in., Garvin County, Oklahoma. Completion date 6-54.

Westcoast Transmission Co., Ltd.—(See foreign natural gas pipe lines).

Foreign Crude-Oil Pipe Lines

• **Arabian American Oil Co.**—18 miles, 22-20-in., planned, Qatif to Ras Tanura No. 3. Completion date 1-55.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products.)

• **Creole Petroleum Corp.**—25 miles, 34-in., planned. Lagunillas to La Salina (State of Zulia, Venezuela.) Completion date 9-54.

Direccion General de Yacimientos Petroliferos Fiscales—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

• **Gaz de France**—200 miles, 12-in. Ruhr to Paris, France.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Ishthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

Petroleos Mexicanos.—125 miles, 10-in., under way, Jose Colomo to El Plan, Mexico.

• **Saskatoon Pipe Line, Ltd.**—56 miles, 6-in., planned, Milden to Saskatoon, Sask.

Texas Petroleum Co.—60 miles, 4-6-in., under way. Pta. Nino de La Dorada.

• **Trans Mountain Oil Pipe Line Co.**—36 miles, planned, Vancouver, B. C., terminal to Ferndale, Wash.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipe Lines

Anglo-Iranian Oil Co., Ltd.—18½ miles, 16-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

18½ miles, 6-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

15 miles, 12-in., under way, Kwinana to Fremantle, M. W. Kellogg Co. Completion date February 1955.

17 miles, 6-in., Kwinana to Fremantle. M. W. Kellogg Co. Completion date February 1955.

Columbian Ministry of Petroleum—115 miles, 4-in., under way, La Dorado to Cartago, Colombia. William Bros. Engineers.

93 miles, 8-in., under way, Cantimplora to Dorado, Colombia. William Bros. Constructors.

• **Empresa Nacional del Petroleo**—80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO)—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line.) Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States and Canadian Governments.**—600 miles, 8-in., planned, Haines to Fairbanks, Alaska.

Foreign Natural-Gas Pipe Lines

Azienda Generale Italiana Petroli—90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

Direccion General del Gas del Estado—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

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PIPE LINE

Sunray Sells 8-In. Products Line to Oklahoma Mississippi

TULSA.—Oklahoma Mississippi River Products Line, Inc., here have purchased 85 miles of 8-in. products line from Allen through Bristow to Drumright, Okla., from Sunray Pipe Line Co., a wholly owned subsidiary of Sunray Oil Corp.

Selling price was approximately $2,000,000. The facilities include pump stations at Allen, Bearden, and Bristow; 160,000 bbl. tank-storage capacity at Allen; and eight storage tanks at Drumright with a cumulative capacity of 492,000 bbl. Operating personnel of the line will on January 1 become employes of Oklahoma Mississippi, in which Sunray owns 50 per cent interest.

The purchased products line will integrate into the 475-mile, 12 and 10-in. system Oklahoma Mississippi is constructing from Duncan to West Memphis, Ark., on the Mississippi River. However, until the new system is completed the 8-in. line will continue to move products to the Drumright terminal.

Lone Star Constructing Central Texas Gas Line

DALLAS.—A 13-mile, 8-in. gas line tapping the newly developed Gause field in Milam County, Texas, with about 30 communities in six Central Texas counties is being constructed by Lone Star Gas Co. here.

The line will run northeast from the field 12 miles to Cameron, Tex. There it will connect with Lone Star's transmission system which serves customers in McLennan, Coryell, Falls, Belton, Milam, and Williamson counties.

Immediate completion is anticipated

Gulf Interstate Gas Line Ahead of Schedule

Despite rocky terrain H. C. Price Co. crews laying the northern portion of Gulf Interstate Gas Co.'s 860-mile, 30-in. transmission system from Arcadia Parish, Louisiana, to Boyd County, Kentucky, are well ahead of construction schedule prior to shutting down for the winter. Price is constructing the line from Central Tennessee to Boyd County, and Houston Contracting Co. is handling the remainder of the project. Here sidebooms lower in a section of the line near Scottsville, Ky. (H. C. Price Co. photo).

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8" and 12" Line

PIPE

300,000' 8⅝" O.D. .322 Wall, 28.55# Lapweld.

270,000' 12¾" O.D. .375 Wall, 49.56# Lapweld.

All machine cleaned, commercially straight, 20' single random lengths, ends beveled. Used first class condition. Suitable installation oil, water or gas pipe line systems 850# to 900# P.S.I. Priced attractively for prompt shipment Welda, Kansas and Grandview, Missouri.

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with the line to have an initial throughput of 8,000,000 cu. ft. of gas daily from the D. H. Byrd, Green No. 1 discovery well. Additional supply will be furnished by other wells as they are completed.

Work on Gulf Interstate's Gas Line Halts for Winter

HOUSTON.—Work on Gulf Interstate Gas Co.'s 860-mile, 30-in. transmission system from the Louisiana Gulf Coast to Boyd County, Kentucky, has ceased for the winter with about 200 miles left to complete.

Houston Contracting Co., Houston, is laying 505 miles of the line from Lake Charles, La., to Columbia, Tenn. The company has completed all but 125 miles of the line below Columbia.

H. C. Price Co., Bartlesville, Okla., is handling construction on that portion of the line from Columbia into Boyd County to Ashland, Ky. Work stopped with 75 miles left to finish to the line's northern terminus.

Both contractors plan to resume work on the system in early spring depending upon weather conditions.

Construction of 475-Mile Products Line Progresses

TULSA.—Approximately two-thirds of the construction work on the eastern part of the Oklahoma Mississippi River Products Line, Inc., 475-mile products system from Duncan, Okla., to West Memphis, Ark., has been completed.

This portion of the project, which is expected to be completed next month, extends from the White River near Conway, Ark., 72 miles eastward to West Memphis. The contractor, Williams Brothers Co. of Tulsa, has completed crossings of the White and St. Francis rivers and is nearing West Memphis.

Another river crossing near Dardanelle, Ark., has almost been completed by River Construction Corp., Fort Worth, contractor for the remainder of the line. The entire $21,000,000 project calls for 12-in. pipe except for a 97-mile stretch of 10-in. and 8-in. between Duncan and Drumright, Okla.

Upon completion in July, the new system will connect the Duncan and Allen, Okla., refineries of Sunray Oil Corp., which hold 50 per cent interest in the line, and other plants in the Drumright area, with a Mississippi River barge terminal. The line's initial capacity will be 35,000 bbl. daily *(The Oil and Gas Journal, October 19, page 190).*

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REFINING

ASPPA to Base Contracts On New Measurement Tables

WASHINGTON.—The Armed Services Petroleum Purchasing Agency here has announced that it will use the new A.S.T.M.-I.P. Petroleum Measurement Tables for its petroleum purchases after December 31.

The announcement came after the Commerce Department's National Bureau of Standards revealed that it will adopt the new tables effective January 1, 1954. These tables will replace the bureau's Circular C-410, National Standard Petroleum Oil Tables, and its supplement, Abridged Volume Correction Table for Petroleum Oils, upon which the ASPPA has based its contracts in the past.

The contracts provided that all individual bulk deliveries of products in excess of 3,500 gal., and all individual residual-fuels deliveries be corrected to a standard temperature of 60° F., in accordance with the supplement. However, the new standard's Table 7, entitled Reduction of Volume to 60° F. Against A.P.I. Gravity at 60° F., will be used as the basis for the contracts. Copies of the table may be procured at 50 cents each from the American Society of Testing Materials, 1516 Race Street, Philadelphia.

Aid to Pilot-Plant Research

Esso Laboratories in Baton Rouge has developed new-type mass spectrometers which have proved successful in monitoring gas streams from pilot plants used in the development of gas adsorption and catalytic-reforming processes. The company reports that the new instruments greatly shorten the time needed in making an analysis and any necessary changes in the pilot-plant operations. Keith P. Lanneau, Esso research physicist who aided in developing the electronic facilities, is shown here with one of the two machines now being tested by the company.

Corpus Christi to Modernize Recently Purchased Refinery

PALESTINE, Tex.—The Inland refinery here will be modernized by its owners, Corpus Christi Refining Co.

Plans call for a new crude-oil treating unit, repairs and modernization of the thermal cracking and poly units, and improvement of the laboratory and office building.

The refinery, which was purchased recently from Byrd Oil Corp., will have an output of 4,500 bbl. The facilities are connected by a gathering system to the Long Lake and East Long Lake pools of Anderson County, Texas, in addition to the Tennessee Colony pool. This system was not sold by Byrd.

Work Starts on Big Still At Pennzoil's Oil City Plant

OIL CITY, Pa.—Work is under way on Pennzoil Co.'s new 9,000-bbl. distillation unit, the largest in this region, at the company's Rouseville refinery near here.

Foundation and underground conduits are presently being constructed with structural steel work to begin in January. The unit will replace three distillation units with a combined capacity of 10,500 bbl. Construction is expected to be completed late next summer.

A.P.I. Mid-Year Meet to Have 12 Refining Sessions

NEW YORK.—The annual American Petroleum Institute Division of Refining's mid-year meeting, set for Houston May 10-13, will comprise 12 technical sessions covering nine different refining fields, according to advance plans.

Three of these sessions will be devoted to petrochemicals, fractionation, and general processing. Refinery main-

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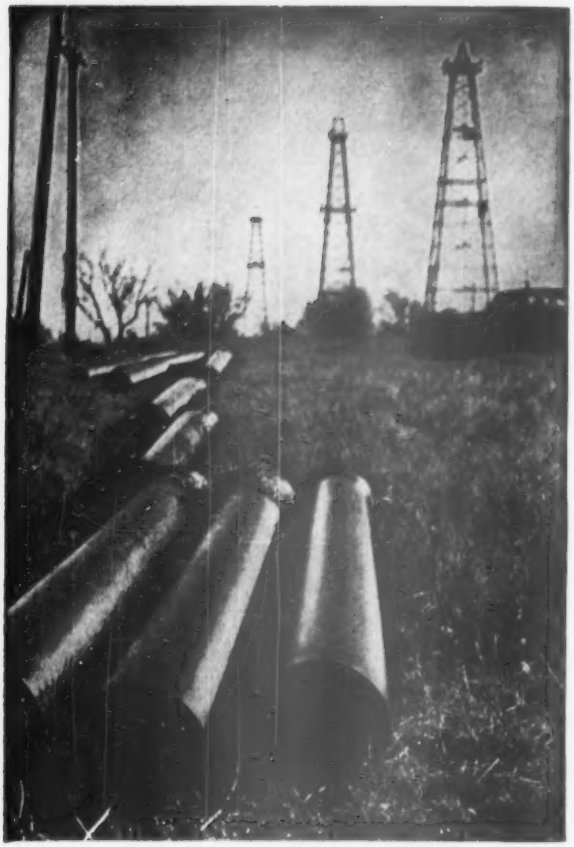

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tenance will be featured in an all-day series of sessions on the second meeting day. One day will be devoted as usual to analytical research. Corrosion will receive attention at a special session with waste disposal and training being given one session each. A series of papers on motor fuels will feature the preignition qualities of fuels and engines, with special attention to be given the affect of additives on preignition tendencies.

Refining Briefs

PHILADELPHIA.—Atlantic Refining Co. plans to sell $55,000,000 in 25-year debentures to pay off short-term bank loans, increase production, and expand refining, transportation, and marketing facilities. Approximately $43,000,000 will be used to pay off the loans.

NEW YORK.—American Cyanamid Co. plans to double the capacity of its anhydrous ammonia plant being built at Fortier, La., near New Orleans. The $50,000,000 facility will produce about 300 tons daily of ammonia.

MOUNTAINTOP, Pa. — Foster Wheeler Corp.'s new plant for producing pressure vessels used in refineries will go into full operation next week. The $5,000,000 plant is part of an $8,000,000 expansion being carried out by the company.

WASHINGTON. — Production of aviation gasoline during the first 8 months of this year rose 17 per cent over the same period in 1952, according to the Bureau of Mines here. Higher octane grades were 50,973,000 bbl. as compared to 42,743,000 bbl. last year. Production of lower grades was 8,859,000 bbl., a slight increase over the 8,346,000 bbl. produced in 1952.

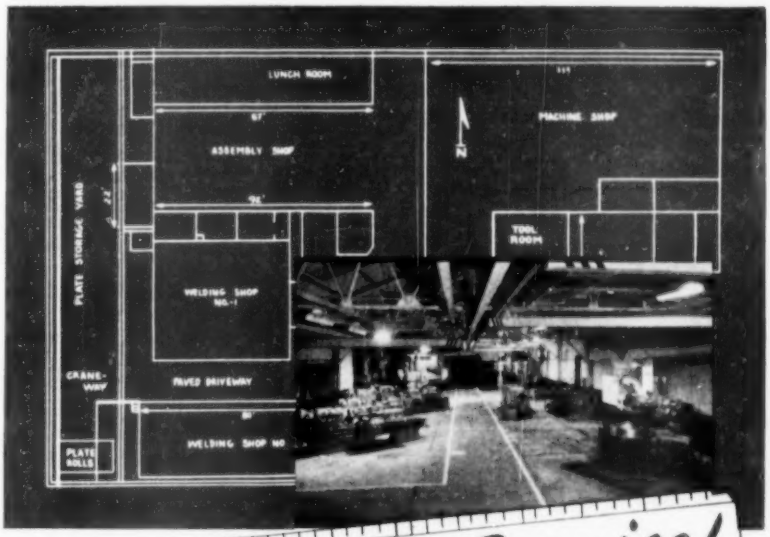
WILMINGTON, Del.—The Petroleum Chemicals Division of the E. I. du Pont de Nemours & Co., Inc., is producing a new tetraethyl lead compound-aviation mix to meet U. S. Air Force standards. The new mix, which has a lower blue dye concentration, will permit refiners to dye military avgas more easily to comply with the recently announced new color standards.

CYRIL, Okla. — Blaw-Knox Co. is installing a new catalytic reforming unit at Anderson-Prichard Oil Corp.'s 10,000-bbl. refinery here. The Catformer, licensed by Atlantic Refining Co., is expected to be completed by next spring.

"THE BRAND OF PROGRESS"

By Heat Exchanger Specialists

▲ SYNOPSIS OF AD #1: Western Supply Company of Tulsa, Oklahoma, started as a small machine shop in 1906. The growth of the Southwestern oil country supported the small operation, and in 1936 Western began building heat exchangers for the pipeline industry. This specialized fabrication soon expanded to encompass the refining, chemical and petrochemical fields.



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PROOF OF FLEXIBLE SERVICE . . . On October 29th of this year a prominent chemical company filed an emergency order for an Amine Reboiler. This unit was engineered, fabricated and delivered by November 15, just 17 days following the customer's desperate phone call. Naturally such short-term delivery is not a general rule, but is an excellent example of the speed which can be achieved when a company is not overwhelmed by its own bulk.

▲ Western Supply Company isn't the largest heat exchanger manufacturer in the country . . . no move has been made nor any proposed in that direction. But Western is a company with a *planned* facilities program, and, since World War II, the addition of the latest mills, lathes, rolling, bending and welding equipment have earned it the reputation of one of the most modernly equipped heat exchanger plants in the United States.

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NATURAL GAS

Tax Showdown Set

Supreme Court to review Texas gas tax next week

WASHINGTON.—Arguments on the constitutionality of a Texas tax on natural gas gathered in that state for export to 38 other states will begin in the U. S. Supreme Court here next week.

Arguing against the tax, which was passed by the Texas Legislature in 1951, will be Panhandle Eastern Pipe Line Co. and Michigan-Wisconsin Pipe Line Co. First, a Texas District Court termed the tax, amounting to 0.45 cent per M.c.f., an unconstitutional burden on interstate commerce. This ruling was reversed by the Third Court of Appeals. The decision of the appeals court was affirmed by the state Supreme Court. The pipe-line firm then appealed to the U. S. Supreme Court, which agreed last October to review the case.

Representative cases . . . The Panhandle and Michigan-Wisconsin cases, along with a suit filed by Amarillo Oil Co., were selected by agreement of state and company attorneys as being representative of the scores of suits filed by pipe-line companies. Panhandle is both an intrastate and interstate transmission firm, while Michigan-Wisconsin picks up its gas at the Texas border and transmits it only interstate. On the other hand, Amarillo operates solely intrastate and contends that the tax if unconstitutional as applied to interstate firms also is invalid in intrastate operation. Its case will not be disposed of in state court until the interstate question is settled *(The Oil and Gas Journal, July 6, page 45)*.

Thus far, about $25,000,000 has been collected from the tax and is being held in escrow until after the high court's decision. The tax was an effort of the state to collect revenue from gas gathered in Texas and marketed in other states. Those opposing the tax claim it will result in higher gas prices for consumers throughout the nation.

Tennessee Revises Plans for Carrying Gas for Equitable

WASHINGTON.—Tennessee Gas Transmission Co., Houston, has revised its plans to transport gas from Texas to Pennsylvania for Equitable Gas Co., Pittsburgh.

Originally Tennessee planned to increase the capacity of its pipe-line system by 24,400,000 cu. ft. daily to enable it to carry the gas. However, according to a new application submitted to the Federal Power Commission, the company would utilize part of the unallocated design day sales capacity which will be available when its authorized construction is completed.

Tennessee still plans to carry out a proposal to construct a 50-mile, 10-in. lateral line from its existing transmission system to Equitable's purchased gas supply in the Flour Bluff fields, Nueces County, Texas. Also, Tennessee will install an additional 28,000 hp. in compressor units at existing stations along its system to transmit the gas to Equitable near Pittsburgh.

Rehearing on Kansas' Higher Hugoton Gas Price Rejected

TOPEKA.—A rehearing on its order increasing the well-head price of natural gas in Hugoton field of Southwest Kansas from 8 to 11 cents has been denied by the Kansas Corporation Commission here.

The rehearing was sought by Cities Service Gas Co., Kansas-Nebraska Natural Gas Co., and over 100 intervening cities. The denial opens the way for the applicants to seek a judicial review of the order, which will go into effect January 1.

The new minimum price will be paid on gas measured at 14.65 psi. as established by the commission July 1. Previously gas in the huge Kansas field was measured at 16.4 psi. The order changing the pressure is now being brought before the Seward County District Court by Panhandle Eastern Pipe Line Co.

Both the minimum price and pressure changes followed a hearing by Kansas royalty owners for a minimum of 14 cents a thousand cubic feet at 16.4 psi., or 12 cents a thousand cubic feet at 14.65 psi.

Spokane Asks Equal Gas Rate in Market Fight

WASHINGTON.—A request for equal natural-gas rates has been made at the Federal Power Commission hearings on gas for the Pacific Northwest by the Spokane Chamber of Commerce.

The chamber stated that it was not taking sides in the dispute between American and Canadian companies petitioning to supply the area but wanted the Northwest to be treated as an integrated community and assured against discrimination in costs among certain localities. It was pointed out that the commission follows a uniform rate policy for hydroelectric power.

Spokesmen for the American applicant, Pacific Northwest Pipe Line Co., termed the statement as an endorsement of their project to bring gas into the Northwest from the San Juan basin of New Mexico. They pointed out that the West Coast Transmission Co., Ltd., proposal to export Alberta gas into the area would cost consumers in Spokane and eastern Washington "at least 8 cents per thousand cubic feet more than it would cost on the coast of Washington and Oregon."

The hearings have been recessed until January 4.

Two Indiana Cities to Get More Gas From Texas Gas

WASHINGTON.—Texas Gas Transmission Corp., Owensboro, Ky., has received Federal Power Commission authority to increase gas deliveries to Linton, Ind., and Terre Haute (Ind.) Gas Corp.

Maximum daily deliveries to Terre Haute will be raised from 9,571,000 to 12,724,000 cu. ft., and to Linton from 2,091,000 to 2,754,000 cu. ft. The deliveries will be made through existing facilities.

Originally, Texas Gas told the commission that the increased deliveries would cause an excess of maximum daily obligations over its system capacity, but a recomputation of the company's system showed that its design capacity on a peak day will exceed the maximum daily obligations to existing customers.

October Sales Register Drop

NEW YORK.—Natural-gas sales during October showed an increase of 399 million therms over the preceding month, but dropped about 58 million therms from the October 1952 totals, according to the American Gas Association here.

The October sales were 3,800 million therms as compared to 3,401 million therms in August, and 3,858 million therms in October 1952. However, for the 12 months ended October 31, sales of 52,893 million therms was a rise of 10.1 per cent over the previous 12-month period sum of 48,038 million therms.

The index of gas sales for the month was 172.1 per cent of the 1947-49 average.

Among the

Drilling Contractors

Tull Made Vice President Of Canadian Drilling Firm

Ray Tull, formerly field superintendent, has been elected vice president of Canbridge Corp., Ltd., rotary drilling contracting company, Calgary, Alta. He is being succeeded as field superintendent by E. H. Farmer, formerly tool pusher. B. Frank Bridges is president.

Both Tull and Farmer came to Alberta early in 1949 with the former Falcon Seaboard of Canada, Ltd., subsidiary of Falcon Seaboard Drilling Co. They continued with Canbridge Corp., Ltd., a wholly Canadian-owned company, when it took over Falcon Seaboard's operations in Canada in June 1951. Before coming to Canada, they were associated with Falcon Seaboard Drilling Co. in Oklahoma.

The Canadian company operates five rotary rigs.

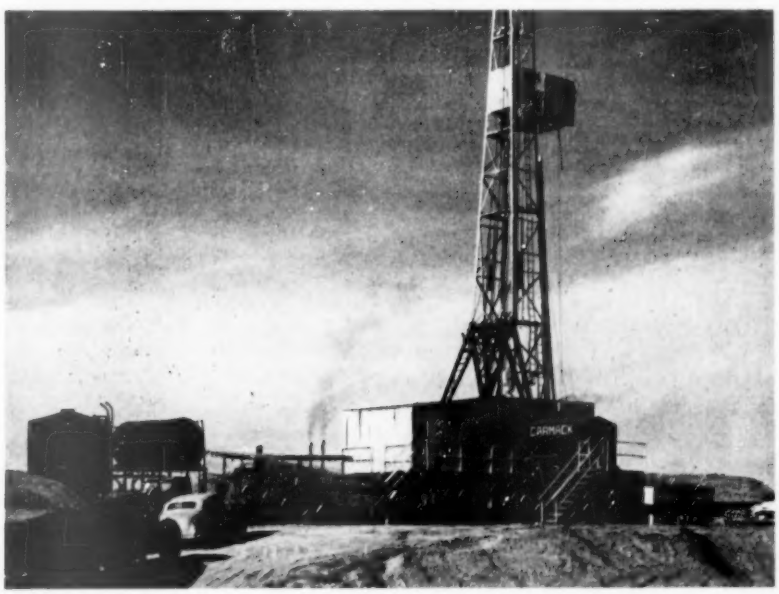
Marshall R. Young has a rig running on a deep test he has contracted to drill for A. O. Phillips, of Dallas, at 1 Rollins, C SE SE 23-5n-8e, 2¾ miles east of Ruth, in southern Lincoln County, Mississippi. Hole is projected to 10,800 ft. for a look at the Lower Cretaceous.

Gene Reid Drilling, Inc., Bakersfield, Calif., has a new wildcat operation under way for Richfield Oil Corp. at 1 Ramsey, in the Santiago Creek area, 9 miles southeast of Maricopa, in Kern County, California. Location is in 22-10-23. Hole is projected to 5,500 ft.

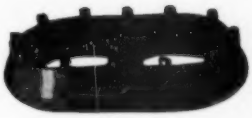
Prince Drilling Co., Houston, has moved a rig to a wildcat location in the Barker area, in western Harris County, Texas Gulf Coast, where it will drill under contract for H. L. Chavanne, trustee, at 1 Pye. Location is 5 miles northeast of Clodine field, nearest production.

Dan Clark is contractor on a 6,500-ft. test Taylor Oil & Gas Co. is starting at a wildcat location 9 miles southeast of Nursury, in Victoria County, South Texas.

A. W. Williams Inspection Co., Mobile, Ala., is drilling for E. B. LaRue and associates on a projected 5,000-ft. test in Liberty County, Georgia. Loca-



FIFTEEN WELLS have been drilled the past year by this rig, being operated by Carmack Drilling Co., of Denver, in the West Sussex area of Johnson County, on the southwestern limb of the Powder River basin, northeastern Wyoming. The rig, drilling under contract for Continental Oil Co., is a Model T-20, powered by two 190-hp. engines, and using a 7¾ by 14-in. pump. Mast is 87 ft. high on an 8-ft. substructure. Wells drilled this year included 13 to 3,000 ft. and 2 to 5,500 ft.



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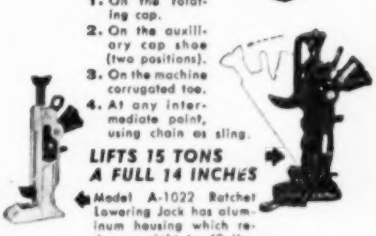

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tion of the test, I Jelks & Rodgers, is 6½ miles southeast of Riceboro, in Block 35, General Military District 15, around which the operator has approximtely 60,000 acres under lease.

Frank Frawley Drilling Co., Tulsa

THE Frank Frawley Drilling Co., which operates in all the deeper areas of the Mid-Continent, West Texas, New Mexico, and Gulf Coast had its inception in April 1950 with the dissolution of the drilling department of the former Barnsdall Oil Co., now merged with Sunray Oil Corp. Principal office is located at 823 South Detroit Street, Tulsa. Field offices and yards are at Oklahoma City and Midland, Tex.

F. E. FRAWLEY

Personnel . . . Most of the company's executive and field personnel formerly were associated with Barnsdall drilling department. President is Frank E. Frawley, formerly manager of that department. Other officers are James D. Frawley, vice president and treasurer; and T. A. Carroll.

Tom Cline is general superintendent. Tool pushers are W. P. Bishop, L. O. Box, Roy Owen, and V. V. Thomasson.

Equipment . . . The four large rotary rigs with which the company started business previously had been owned and operated by Barnsdall Oil Co. Currently operated are steam and three mechanically powered rotary rigs.

Current operations . . . The steam rig is under contract to Sunray Oil Corp. on an 11,500-ft. well in the Northwest Branch field, Acadia Parish, coastal Louisiana. One power rig is drilling a 10,000-ft. test for Sinclair Oil & Gas Co. in Lazy J field, Lea County, New Mexico. Another is on a 13,000-ft. test for the same operator in Pegasus field, Midland County, Texas. The other is working for Fullerton Oil Co. on a deep wildcat test, 1-B Redmond, in Pecos County, Texas.

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EXPLORATION

Warrior Basin Prospects Expand

by Neil Williams

ADDITIONAL potentialities for exploration in the Black Warrior basin of northeastern Mississippi and northwestern Alabama are being revealed by recent discoveries of possible production in formations of both Upper Ordovician and Pennsylvanian age.

The latter discoveries come at the start of an impending rejuvenated exploratory play to exploit potentialities of the Knox dolomite, which was established as a new productive horizon last October by Magnolia Petroleum's discovery in the New Hope area of Monroe County, Mississippi.

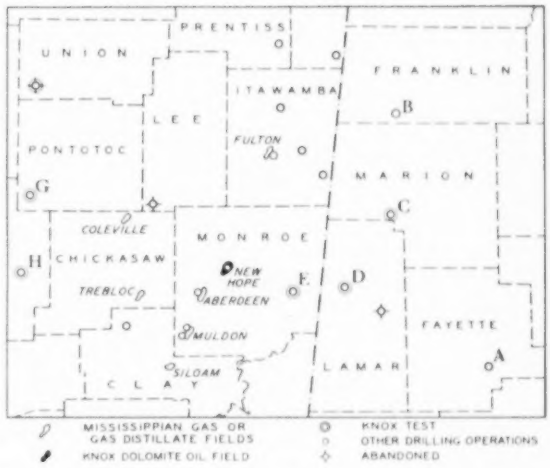
In the meantime, rocks of upper Mississippian age, primary objective of exploration prior to Magnolia's Knox dolomite discovery, continue a major potential source of additional production and new exploration.

Although the commercial value of the current Upper Ordovician and Pennsylvanian discoveries has not been established, the showings encountered are significant and sufficient to warrant consideration of these horizons as exploratory objectives.

A possible Upper Ordovician discovery has been in a rank wildcat test (G) drilled by L. E. Salmon in Pontotoc County, Mississippi, on the far western extremity of exploration in the basin. This wildcat was drilled to 5,904 ft. in Knox dolomite, found unproductive, and was plugged back to a sand at 5,270-5,320 ft., in the top of the Ordovician, in which gas showings had been encountered.

As in the case of Upper Mississippian sands, which have been found productive of gas and distillate in a half dozen fields so far, the Ordovician sand is very tight. Production tests have yielded a small flow of gas, burning a 12 to 15-ft. flare. Such flows were characteristic of some of the Mississippian discoveries before formation fracturing resulted in more sizable and commercial production.

Pennsylvanian production, also gas, is indicated in Fayette County, Alabama, on the opposite side of the basin, where James L. Duffy and Jack Harrington have been attempting to complete their 1 Shepherd estate (A) in a sand, open through casing perforations at 2,004-13 ft. From this sand, the wildcat flowed an unestimated volume of gas, water, and mud, and for a time blew out of control and ignited, burning a 60-ft. flame. This is an old hole, which had encountered gas-distillate showings in the Mississippian-Carter zone. Tests in the latter zone, perforated at 3,160-74 ft., yielded salt water.



Prospects of Pennsylvanian production also have been given recently in a well drilled by Union Producing Co. at Muldon, the Mississippian gas field, discovery of which, early in 1952, initiated the current exploratory play. Union's well showed oil on the pits while drilling in Pennsylvanian below 3,850 ft. A series of drill-stem tests through the section failed to locate the source of the oil, and the well since has been drilled to the field's pay below 5,500 ft.

In the developing exploration of potentialities of the Knox dolomite, found productive of oil in Magnolia's New Hope discovery, Magnolia has reached the pay in its first confirmation well, and results should be known shortly. Three other tests, rank wildcats, have been drilled to that horizon since the discovery. One, in Union County, Mississippi, has been abandoned. The other two, in Alabama, (C) in Marion County, and (D) in Lamar County, still are drilling without important showings as yet.

Other Knox tests now drilling, but not yet in that horizon, are at (H), in Calhoun County, and (E), in Monroe County, Mississippi; and (B), in Franklin County, Alabama. The latter is near a small Mississippian gas-discovery well now in process of completion.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

OKLAHOMA . . . George J. Greer, Trustee, and San Juan Drilling Co. 1 Hammer, Garfield County Misener sand discovery in NE NW NE 2-20n-5w, west of the Nemaha Ridge, kicked off and flowed an average of 70 bbl. of oil per hour for 8 hours on various chokes. Perforations were made in the casing at 6,646-60 ft.

MONTANA . . . Lion Oil Co. is reported to have recovered oil from what is presumed to be the Madison at 1 Knight, C SW NW 29-14n-60e, in the Wibaux area of Wibaux County. The tight hole is extremely important due to its location about midway between Fryburg field in North Dakota and the Cedar Creek anticline in Montana.

COLORADO . . . Amerada Petroleum Corp. and British-American Oil Producing Co. recovered gas at the rate of 4,000 M.c.f. daily on test of the first producing well in the southeastern Colorado portion of the Anadarko basin. The 1 Neu, SE SE NW 33-32s-41w, is ½ mile west of the Morton County, Kansas, line. The discovery is classed as an extension to prolific Greenwood gas field in Morton County.

Wildcat Completions, November 1953

	Total	Oil	Gas	Dry	Footage	1953 Total comp.	1953 Cum. (1,000 ft.)	1952 Total comp.	1952 Cum. (1,000 ft.)
Kansas	62	7	4	51	247,193	821	3,124	772	3,006
Oklahoma	41	6	4	31	200,896	691	3,050	662	3,126
Texas	379	62	8	309	1,875,939	4,840	23,833	4,490	21,537
North Central	147	29	1	117	541,037	1,956	7,028	1,948	6,599
West	66	9	0	57	387,154	804	4,828	799	4,738
Panhandle	8	0	0	8	53,133	29	160	71	439
East	18	2	0	16	92,862	269	1,368	232	1,252
Gulf Coast	58	7	3	48	418,152	809	5,777	657	4,907
Southwest	82	15	4	63	383,601	973	4,672	783	3,602
Louisiana	39	13	0	26	326,696	474	4,152	375	3,200
North	19	2	0	17	106,109	165	956	182	1,087
South	20	11	0	9	220,587	309	3,196	193	2,113
Mississippi	20	3	1	16	136,308	191	1,350	170	1,241
Arkansas	10	0	0	10	42,376	130	465	89	392
Nebraska	10	1	0	9	46,276	143	728	159	688
Rocky Mountain	60	8	1	51	289,787	636	3,480	505	2,601
Dakotas	17	0	1	16	70,082	99	513	42	271
New Mexico	21	4	3	14	165,192	160	1,081	155	1,030
California	52	5	3	44	246,446	598	2,875	547	2,533
Tri-States	87	5	0	82	154,744	926	1,801	1,256	2,648
Others	51	2	3	46	176,162	454	1,551	478	1,366
Total November 1953	849	116	28	705	3,978,097	10,163	48,003	9,700	43,639
Total October 1953	945	109	28	808	4,485,122				
Cumulative 1953	10,163	1,448	344	8,371	48,002,886	10,163	48,003		
Cumulative 1952	9,700	1,386	243	8,071	43,639,199			9,700	43,639

Wildcats Drop Ten Per Cent

by John C. McCaslin

ELEVENTH-MONTH wildcat completions dropped 10 per cent from the October record high. Operators finaled 849 exploratory tests, the lowest number since April. However, cumulative wildcat completions for 1953 show a 5 per cent gain over last year. All areas except Nebraska and the tristate region show an increase over 1952's figures. It appears that the industry will fail to drill the 11,371 wildcats forecast for completion in 1953. Cumulative wildcat totals now stand at 10,163, leaving 1,208 tests to be drilled this year.

An indicated discovery in South Dakota highlighted exploratory news in November. Mississippi's Black Warrior basin got back into the headlines during the month with indications of Upper Ordovician and Pennsylvanian production. In West Texas, drilling activity picked up considerably at a time when operations are normally curtailed. A count of rotary rigs at month's end showed a total of 574, compared with 503 the previous month. This total compared favorably with the number of rigs running during the last month of the Spraberry boom.

Williston basin . . . Shell Oil Co. has prospects of opening first oil production in South Dakota at its Custer area wildcat in Harding County.

On test of the interval 8,589-8,604 ft. recovery at the 1 State "A," SW SE 9-21n-4e, was 570 ft. of black 22.1°-gravity oil, 90 ft. of highly mud and gas-cut oil, and 100 ft. of highly oil and gas-cut water. Testing was in the Red River (Ordovician). Shell is swabbing intermittently and recovering oil and water in ungaged amounts at the test. The operator recovered 162 bbl. of oil and 96 bbl. of water on swab tests of perforations at 8,715-28 ft.

The indicated strike is on a seismic prospect about 30 miles southeast of Ordovician production at Little Beaver field in Fallon County, Montana, and is about 75 miles south of nearest production in North Dakota at Fryburg in Billings County. The apparent discovery is about 6 miles northeast of a recent Carter Oil Co. wildcat which had slight shows in the Red River.

Black Warrior basin . . . There were indications of Upper Ordovician and Pennsylvanian production at two wildcats in Mississippi's northeastern area. The Upper Ordovician shows were found at a rank wildcat in Pontotoc County. The wildcat is testing and showing for a small gas producer. It is L. E. Salmon 1 Patterson in 21-11s-1e.

The Pennsylvanian shows were found at Union Producing Co. 1-A Ott unit in Muldon field, Monroe County. Oil flowed to pits while drilling in the Pennsylvanian. The operator was unable to determine from which zone the oil was coming from and is drilling on into the Mississippian-Chester. All previous production in the basin has been from the Chester with the exception of Magnolia Petroleum Co.'s significant Cambro-Ordovician discovery in Monroe County, which was completed on the pump for about 200 bbl. of oil per day last fall. The Magnolia discovery is the first oil production in the basin.

West Texas . . . Developments during the month included the completion of a good Devonian discovery in north Andrews County by L. M. Glasco and others. In the deep fields of northeast Andrews County, Anderson-Prichard Oil Corp., added Ellenburger oil to a Devonian field at their University-I well, and east of Means field, Forest and Montgomery 1-C University had indications of making a good Strawn discovery if the lower horizons proved barren.

In Midland County, new exploration work had favorable shows in the area between Parks and Pegasus fields. Warren Oil Corp. 1 Sanders flowed Strawn oil while drilling, and Magnolia Petroleum Co. completed a small Pennsylvanian well about 4 miles south of Parks-Pennsylvanian pool. The same distance west of nearest Parks production, Rowan et al 1 Parks had recovered Pennsylvanian oil on drill-stem tests.

Completions Take Sharp Decline

by John C. McCaslin

TOTAL completions in the United States in November showed a sharp decline from the previous month's record high, and were the lowest since last June. Operators completed 4,043 wells, down 17 per cent from October totals. However, cumulative completions for 1953 continue to stay far out in front of last year's figures. As of November 1 the year's record stood at 45,187 wells completed, 2,920 more than at the same period last year. Total completions for the entire year in 1952 were 45,821 with more than 187 million feet of hole dug. Total footage for the first 11 months of this year stands at 182,654,043 ft., promising that 1953 will set a new record.

As the year draws to a close several areas in the country report record activity. The coastal area of Louisiana is experiencing one of the most active drilling campaigns in recent years. Late in November 60 wildcats were drilling in southern Louisiana parishes. There were about 200 field operations under way in the area, making the month a record one. Only a small percentage of the activity is in offshore areas, mostly in Plaquemines Parish. Production is found at a depth of from 400 to below 17,000 ft. in this area, but the average producing depth is 10,000 ft. or Miocene pays. The leading parishes in South Louisiana in activity are Lafourche and Plaquemines. Trend in coastal Louisiana has been consistently towards new and deeper pay zones.

Current activity up . . . In the southeastern states Mississippi retains its lead with high activity reported in the Pistol Ridge-Maxie area. On the Texas Gulf Coast the Kuhlman-Bender area of northern Harris and southern Montgomery counties leads in drilling. The Nueces - San Patricio - Aransas County area of Southwest Texas is experiencing considerable drilling activity. West Texas' hot spot continues to be in Andrews County. Total Texas completions have lagged far behind last year's figures, but in December have shown a marked increase and very likely will pass last year's totals by January 1.

As the development and wildcat activity in southern Weston County, Wyoming, the Rocky Mountain area's high-interest region, increases, exploratory drilling in northwestern Niobrara County shows a marked gain. Two tests in this area are currently drilling. Both have found shows in the Steele and Frontier. Two wildcats are slated for the area. There is also activity slated for the eastern part of the county.

SUMMARY OF COMPLETIONS, NOVEMBER 1953

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
Ala.-Ga.-Fla.	12	0	0	12	1	5	5	1	0	0	58,241	14
Arkansas	53	26	0	27	6	33	10	4	0	0	222,573	77
California	213	157	7	49	68	83	30	16	13	3	935,329	240
Colorado	69	34	2	33	5	11	50	3	0	0	365,534	84
Illinois	233	136	0	97	81	152	0	0	0	0	591,986	430
Indiana	106	44	0	62	97	9	0	0	0	0	170,551	170
Kansas	327	167	18	142	51	267	9	0	0	0	1,104,958	376
Kentucky	118	55	17	46	91	27	0	0	0	0	237,547	76
Louisiana	265	158	27	80	99	43	38	35	35	15	1,456,547	384
North	156	89	20	47	93	33	26	4	0	0	464,196	145
South	109	69	7	33	6	10	12	31	35	15	992,351	239
Michigan	73	32	1	40	47	24	2	0	0	0	175,861	117
Mississippi	40	16	1	23	1	0	34	4	1	0	267,014	36
Montana	52	19	6	27	18	23	4	6	1	0	197,448	81
Nebraska	18	4	1	13	1	9	8	0	0	0	88,220	38
New Mexico	130	47	62	21	22	24	60	13	5	6	753,432	187
New York	70	35	0	35	70	0	0	0	0	0	98,000	65
North Dakota	23	9	1	13	6	3	1	13	0	0	132,628	36
Ohio	93	42	16	35	55	35	3	0	0	0	192,437	199
Oklahoma	555	336	22	197	206	260	66	18	4	1	1,798,301	1,258
Pennsylvania	148	60	33	55	114	9	25	0	0	0	351,613	190
Texas	1,284	742	45	497	311	449	348	137	28	11	5,888,48	1,229
North Central (7-B & 9)	476	268	1	207	187	177	106	6	0	0	1,638,541	323
West (7-C & 8)	294	203	1	90	37	98	103	42	8	6	1,564,221	364
Panhandle (10)	59	37	10	12	3	44	11	0	1	0	233,456	35
East (5 & 6)	62	30	8	24	7	22	23	9	1	0	332,649	108
Gulf Coast (2 & 3)	186	94	15	77	20	37	57	54	14	4	1,202,157	260
Southwest (1 & 4)	207	110	10	87	57	71	48	26	4	1	917,462	139
Utah	5	1	1	3	2	1	2	0	0	0	17,147	24
West Virginia	65	6	48	11	33	29	2	1	0	0	180,575	176
Wyoming	86	65	2	19	7	39	37	2	1	0	421,891	310
Miscellaneous	85	0	0	5	3	0	2	0	0	0	16,710	¶23
Total November 1953	4,043	†2,191	310	*1,542	1,395	1,535	736	253	88	36	15,723,029	15,820
Total October 1953	4,740	2,489	357	1,894	1,556	1,881	816	316	133	38	18,719,774	5,636
Cumulative 1953	45,187	23,544	3,520	18,123	14,027	18,312	7,936	3,233	1,278	401	182,654,043	
Cumulative 1952	42,267	21,776	2,980	17,511	13,105	16,864	7,442	3,299	1,248	309	172,689,783	
Western Canada	207	136	19	52	47	86	58	13	3	0	879,057	
Alberta	126	85	16	25	13	47	53	11	2	0	610,735	
Saskatchewan	66	40	1	25	26	34	5	1	0	0	215,822	
Manitoba	11	11	0	0	8	3	0	0	0	0	25,469	
British Columbia	4	0	2	2	0	2	0	1	1	0	27,031	

*Incl. 122 service wells: Kans. 4, S. La. 1, N. Y. 35, Ohio 9, Okla. 21, Pa. 49, N. Tex. 1, Calif. 2. †Incl. 34 condensate wells: S. La. 11, Miss. 2, Okla. 4, N. Tex. 2, W. Tex. 1, Panhandle 1, E. Tex. 1, Gulf Coast 11, S.W. Tex. 1. ‡Incl. all wells rigged up and/or drilling at month end. §Two dry Tenn., 2,475 ft.; S. D. 3 dry, 14,235 ft. ¶Incl. Tenn. 10, S. D. 5, Nev. 7, Idaho 1.

ROCKY MOUNTAIN

NORTH DAKOTA

Golden Valley County Has Apparent Discovery

The central portion of the Williston basin in western North Dakota and in eastern Montana has one apparent discovery, and another credited as a possible discovery on the basis of widely circulated but unconfirmed reports.

Gulf Oil Corp. and Union Pacific Railway Co. recovered oil from Mission Canyon of Mississippian age at 1 Government-Dorough, C NE SW 24-143n-103w, in the Trotters area of Golden Valley County. Test 9,276-9,341 ft. made 40 ft. of 22°-gravity oil in 2 hours. In addition to the free oil, recovery included 180 ft. of gas, 1,350 ft. of oil and gas-cut water cushion, 150 ft. of oil and gas-cut mud and 30 ft. of black sulfur water. Flowing pressure was 595-650 psi.

An earlier drill-stem test 9,196-9,221 ft. recovered slightly gassy mud. Core 9,221-75 ft. recovered 4 ft. of staining near the top. Cores 9,276-97, and 9,297-9,341 ft. recovered 32 ft. of limestone with oil stain and odor scattered throughout. A core from 9,341-65 ft. had 17 ft. of similar recovery. Substantially the same type of recovery was made from 9,365-97 ft.

A drill-stem test 9,341-97 ft. recovered 270 ft. of oil-cut mud and 2,430 ft. of slightly oil and gas-cut salty, sulfur water. The operator is shut down for repairs at 9,397 ft.

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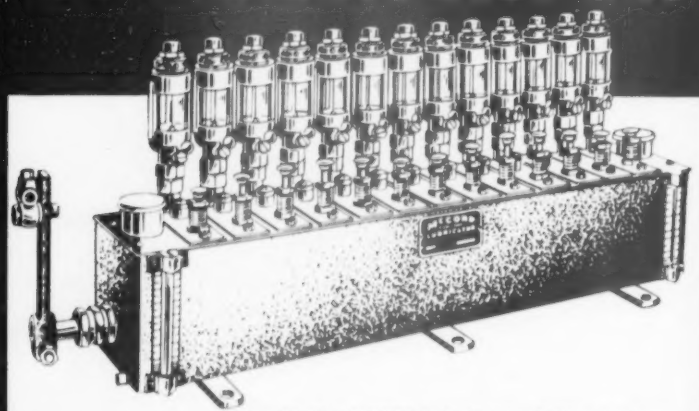

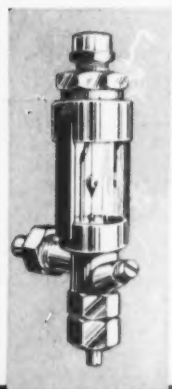

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Twenty-one miles southwest of the Gulf Oil wildcat, Blackwood and Nichols have run protection string to 8,564 ft. and are preparing to drill ahead below that depth at 1 Gilman-Lang, C NE SE 15-140n-105w. This well is a tight hole and no details have been released.

In Wibaux County, Montana, but part of the same area of interest, Lion Oil Co. has refused to confirm or deny reports of recovery of substantial quantities of oil from Madison at 1 Knight, C SW NW 29-14n-60e. Widely circulated reports in the Williston basin credited this operator with recovery of more than 1,000 ft. of oil on one test, and a substantial quantity of oil with water cushion on another. Lion, however, has said that figures in circulation in the region are incorrect, but has not repudiated the reports of shows. This well is about 15 miles west of the Blackwood and Nichols well in Golden Valley County, North Dakota.

The three wildcats are regarded as very important by Williston basin operators, since they are located in and west of a possible trend axis connecting Fryburg pool in Billings County, North Dakota with East Poplar field in Roosevelt County, Montana by way of Brorson pool in Richland County, Montana.

The area has been heavily shot during the past 2 years, and the discoveries at Fryburg and at Brorson are the first two successes on seismic prospects in the Williston basin. Production at Fryburg is from Madison, with some indication of commercial production found in the shallower Heath. At Brorson production is from Ordovician. All three of the wells along the potential trend are scheduled to test at least through Ordovician.

Williams County Discovery Reports Gage

Amerada Petroleum Corp. reported a gage of 114 bbl. of oil in 6 hours from 1 North Dakota, F, C NW NW 36-155n-96w, discovery 3 miles south of Beaver Lodge field in Williams County. The well produced from Madison at 8,317-57 ft. through 15/64-in. choke. Recovery during the 6-hour period included 47 bbl. of load oil and 22 bbl. of water. The operator is still testing.

Dunn County Wildcat Has Additional Slight Show

Carter Oil Co. has reported recovery of slight shows of oil in core from 1 Lockwood, C SE NW 6-141n-94w in the Carsin area, Dunn County. Core was cut 8,549-78 ft. and recovered 29 ft. of limestone with very slight shows and fluorescence. Only mud was recovered on test of a previous zone with similar shows at 8,534-50 ft.

WYOMING

Tensleep Shows Found In Manderson Area

L. J. Petersen reported recovery of staining in cores of Tensleep at 2 Wycol-Government, C SW NW 1-49n-92w in the South Manderson area, Big Horn County. Core 5,880-5,937 ft. was anhydritic sandstone with good fracture, and bleeding oil. Core below this interval was also stained, but had very little porosity.

No tests have been run in Tensleep in this well, but the operator will attempt a Tensleep completion, which, if successful, will mark the opening of a new pay in the area. A total of 44 ft. of saturation was reported

in cores of Phosphoria which has previously produced in this area, but the Tensleep completion is more desirable due to a lack of processing facilities for the sour Phosphoria crude. Peterson is reported coring below 5,982 ft.

MONTANA

Porcupine Dome Wildcat Testing Shows

C. H. Murphy Corp. is running drill-stem test of an interval which had oil stain in core at 1 Firemoon, C SE SE 12-30n-41e, in the East Porcupine Creek area, Valley County. The show was in Madison and test is being run of the zone 5,096-5,109 ft. Total depth is 5,151 ft. Location is on seismic prospect on the western flank of the Williston basin portion of the state.

SOUTH DAKOTA

Oil Recovery Increasing at Harding County Wildcat

Shell Oil Co. swabbed a new set of perforations in Red River of Ordovician age at 1 State A, SW SE 9-21n-4e, in the Custer area, Harding County, for the most encouraging recovery to date. Perforations 8,587-8,600 ft. were acidized, and in 2 days of intermittent swabbing the recovery was 355 bbl. of oil with 6 bbl. of water and 11 bbl. of acid water. The operator is preparing to put the well on pump for further testing. If successful, this wildcat will be South Dakota's first producer.

Natrona County Discovery Completed

Superior Oil Co. has completed a Phosphoria discovery at 36-14 Government, SW NE SW 14-37n-85w, in the Okie Draw area of Natrona County. The well had been unofficially reported as a discovery some time ago, with no details released by the operator. Potential, according to Superior is 180 bbl. of 24°-gravity oil per day. Casing was landed at 2,800 ft. and perforated 2,729-33, 2,740-46 and 2,748-59 ft. in Phosphoria.

The discovery is drilled on land farmed out from Trigood Oil Co. of Casper. Superior and Trigood are drilling a confirmation in the area. The discovery is 1½ miles from Notches field where production is from Tensleep. The area is being unitized, but operator has not been announced.

Beaver Creek Deep Producer Assured

Stanolind Oil & Gas Co. has apparently assured first production from Madison in Beaver Creek field, Fremont County, with recovery of 2,800 ft. of free oil on drill-stem test of the zone 11,360-11,379 ft. The field produces from five higher zones, but has not previously been tested to Madison. Oil is 40° gravity.

NEBRASKA

Kimball County Wildcat Is "J" Sand Discovery

Eddie Fisher and Balderson-Denver Drilling Co. recovered 4,900 ft. of oil in 1-hour test of a 4-ft. "J" sand interval 6,258-62 ft. at 1 Harrison, SW SE NW 11-12n-55w, northeast of Long field in Kimball County, Nebraska. Included in the recovered was 190

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ft. oil-cut drilling mud and 60 ft. of oil and mud-cut water. The operators are running casing.

COLORADO

Morgan County Wildcat Finds Gas

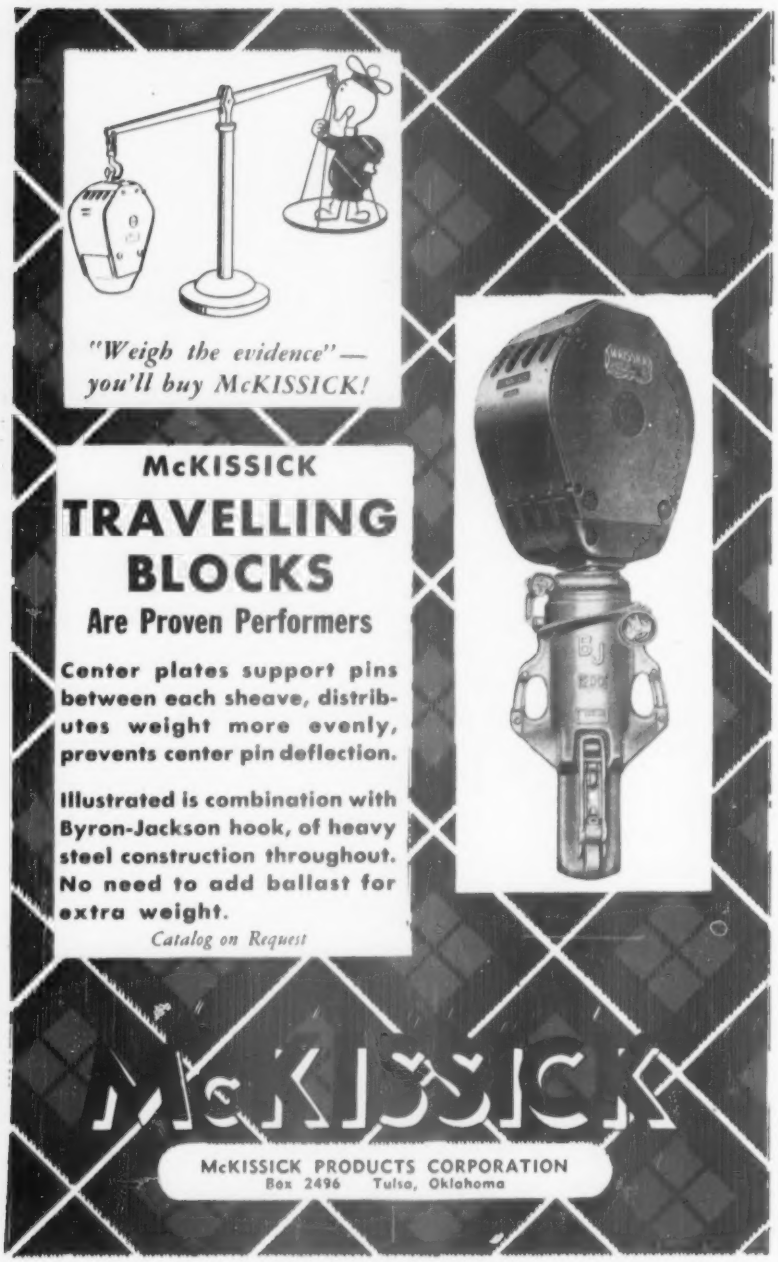
Chittim and Allardyce, independents of Denver, recovered gas at the estimated rate of 25,000 M.c.f. per day on test 5,489-5,521 ft. at 1 Clenn, NW SE SE 32-2n-57w, Morgan County. Production is from "J" sand. Recovery in pipe was 270 ft. of free oil, 42.7° gravity. Total depth is 5,540 ft. and operators have run casing. The discovery is northeast of previous recent discoveries in this county.

Baca County Producer Tested

Amerada Petroleum Corp. and British-American Oil Producing Co. reported recovery of gas at the rate of 4,000 M.c.f. per day at 1 Neu, SE SE NW 33-32s-41w in Baca County. The well is the first producer in the Colorado portion of the Anadarko basin.

Production is from Lansing, topped at 3,225 ft. The well is ½ mile west of the Morton County, Kansas line, and is designated by the operators as an extension to Greenwood field in Kansas, rather than as a discovery.

Nearest Greenwood field production is 2 miles to the southeast. Production in Morton County has been established along about an 18-mile strip east of the Colorado line, but the present well is the first southeastern Colorado gas production of any consequence.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CALIFORNIA

Richfield Opens New Oil Pay in Los Lobos Area

A new deeper Miocene oil zone opened by Richfield Oil Corp. in Los Lobos field, on the south end of San Joaquin Valley, is expected to be of much greater importance than the Pliocene-Etchegoin sand which has been under development for the past 1½ years.

The discovery well, 27-20 San Emidio-A in SW SW 20-11n-22w, was completed flowing at the rate of 440 bbl. daily through a 24/64-in. choke. Production was through perforations at 6,488-6,657 ft. in the Reef Ridge sand. The pool opener is located 1 mile west of the Etchegoin sand discovery, completed at 7,250 ft. in July 1952. None of the eight Los Lobos wells completed earlier were carried sufficiently deep, stratigraphically, to evaluate Reef Ridge production.

Deep La Mirada Discovery

Tide Water Associated Oil Co. completed 1 McNally in the La Mirada area 2 miles west of West Coyote field, near the Los Angeles-Orange County line, as a 200-bbl. flowing discovery. Production, through an 8/64-in. choke, was from the interval 11,915-12,005 ft. The wildcat is situated on a 2,000-acre block in which Sterling & Trousdale hold a 50 per cent interest. Site is in NE SW 22-3-11w, south and west ¼ to ¾ mile from five 10,000-11,000 ft. dry holes drilled by The Texas Co., Union Oil Co., and General Petroleum Corp.

Shallow Find Indicated For Pyramid Hills Area

The Pyramid Hills-Alferitz Anticline area of westside San Joanquin Valley, which in recent weeks has yielded two new oil discoveries, may be the scene of a new shallow Eocene discovery. Caminol Co. 1 Dagany in SW NE 33-24s-18e cored Point of Rocks oil sand from 703 to 776 ft. Following tests, during which 16°-gravity crude was recovered, drilling was resumed toward the originally scheduled 5,000 ft. depth.

The wildcat is approximately 2 miles southeast of Reserve Oil & Gas Co.'s recent 4,400-ft. Kreyenhagen sand discovery, zone for which it is prospecting. It is about 2½ miles northwest of Carlton Beal & Associates 56-11 Kalloch, recently completed in sand stringers of the Tumey shale at intervals between 4,590 and 4,865 ft.

Oxnard Tests Nearing Bottom

Three exploratory tests under way in the Oxnard area of Ventura County were being closely watched as they neared critical depths for finding Sespe oil production. Bay Shore Oil Co., Inc. 1 Maulhardt Community, 1½ miles west of Standard Oil Co. of California's deeper pool opener, was drilling below 6,100 ft. Lloyd Corp., Ltd., 1 Lloyd Corp., a ½-mile northeast step-out to the 6,300-ft. discovery, was past 6,000 ft. Southwest of the discovery about 1 mile, Standard 1 Lucas was below 6,700 ft. Standard 1 Scholle-Liv-

ingston in SW SW 32-2n-21w, about 1 mile northeast of its 1 McInnes deeper pool discovery, was continuing to be pump tested.

KANSAS

Oil Recovered at Kingman County Test

Pickrell Drilling Co., Frank Purcell and Globe Construction Co. have an indicated discovery well at 1 Banta, SW SW SW 34-30s-8w, wildcat 2 miles southeast of Spivey pool in the southern part of Kingman County in the Sedgwick basin.

A drill-stem test at 4,383-4,401 ft. gaged 1,000 M.c.f. of gas and recovery was 150 ft. of heavily oil-cut mud. Another test taken at 4,403-21 ft. recovered 90 ft. of heavily oil and gas-cut mud, 120 ft. muddy, gas oil, 60 ft. free oil and 5 ft. of water. Recovery on a test at 4,423-41 ft. was 90 ft. of heavily oil and gas-cut mud, 105 ft. oily mud and 15 ft. water.

Good Gas Discovery Made in Barber County

San Diego Oil Corp. tested up to 10,000 M.c.f. of gas per day at 1 Harbough, SE SE NE 33-33s-11w, wildcat 2¼ miles south of Rhodes pool in the southeastern section of Barber County. The gas flow came from perforations at 4,453-95 ft. in the Mississippi.

Elsewhere in Barber County, Barbara Oil Co. is waiting for potential test at their 1 Forester, SW NW NE 28-33s-11w, wildcat discovery 1 mile south of Rhodes pool in eastern Barber. A flow of 10 bbl. of oil per hour was logged at the discovery. Fracturing brought 50 bbl. of oil in 1 hour followed by a steady flow of 10 bbl. per hour from perforations at 4,486-97 ft.

Morris Pool Opener Goes on the Pump

Pump is being installed at a new pool discovery well, William Grunerwald 1 Williams, NW NE NW 26-15s-9e, rank wildcat 11 miles southeast of Alta Vista gas pool in eastern Morris County, just east of the Nemaha granite ridge, and 4 miles northeast of Council Grove, Kansas.

A 1,500-ft. oil fill-up in 2 hours was logged at the Viola discovery.

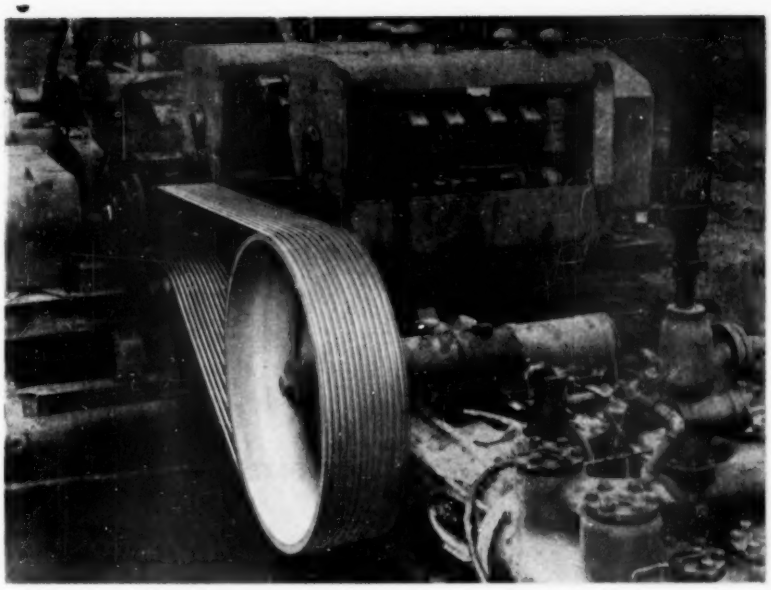
Shows Logged at Remote Ness County Prospect

Lower Pennsylvanian oil shows were logged at Sohio Petroleum Co. 1 Herman, NW NW SE 36-18s-24w, wildcat on the southwest edge of Ness City and 12 miles east of Aldrich pool in the central part of Ness County.

Recovery on a drill-stem test at 4,157-86 ft. was 32 ft. slightly oil and gas-cut mud, 90 ft. heavily oil and gas-cut mud, 30 ft. oil and gas-cut salt water and 570 ft. of gas.

INDIANA

Near Siberia, Perry County, Millened, Inc. 1 Gehlhausen, 25-3s-3w, 8 miles from production, pumped 11 bbl. of oil the first 11½ hours from 7 ft. of saturated Salem lime. The discovery is causing an active leasing campaign, and several other wells are active in the area.



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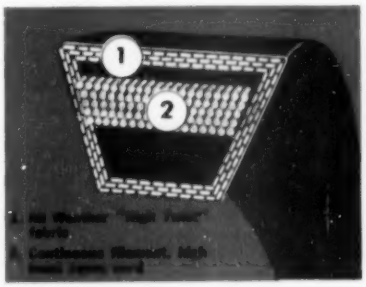

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CANADA

Wet Gas Hit at Minnehik Area Wildcat

The Minnehik area wildcat that discovered light-gravity crude oil in the Viking sand last month, has struck some wet gas in basal Cretaceous, and is chalked up as a 2¼ mile north extension to Mississippian wet gas in that region. This well is 58 miles west of Wetaskiwin and 60 miles southwest of Edmonton.

This possible triple-zone producer, which lies less than 12 miles from Cardium oil production in the Pembina-Buck Creek area and 2¼ miles north-northwest of the Canadian Delhi et al 1 Minnehik Mississippian wet gas discovery well, is Canadian Delhi-Great Plains et al 11-33 Minnehik, LSD 11, 33-46-6w5.

After entering the basal Cretaceous this well drill-stem tested from 6,551-61 ft., but received only a small gas flow. Test from 6,560-80 ft. flowed gas at rate that steadied off at 768,000 cu. ft. daily, and yielded a pipe recovery of 15 ft. of condensate.

Initial drill-stem test in the Mississippian wet gas horizon was run for 25 minutes from 6,697-6,712 ft. Wet gas flowed to the surface in 12 minutes, at maximum rate 4,000,000 cu. ft. daily, and recovery was 90 ft. of 60°-gravity distillate. The Mississippian contact has not as yet been released, but it is understood that it is near top of the above drill-stem test. A second test in this pay zone was run from 6,712-22 f. Wet gas flowed in 1 minute at maximum rate 3,380,000 cu. ft. daily, and crew was pulling drill pipe at weekend report. Previous drill-stem tests in the Viking sand gave up 37°-gravity oil at this Minnehik well. Test from 5,881-5,906 ft. flowed gas at 139,000 cu. ft. daily and gave up 830 ft. of oil. Test from 5,905-17 ft. flowed gas at 440,000 cu. ft. daily and flowed oil in 20 minutes. Recovery was 1,090 ft. of oil, no water.

Saskatchewan . . . A wildcat in the southwestern sector of Saskatchewan that was recorded as a natural gas discovery in the Viking sand, this week discovered heavy-gravity crude oil in the detrital chert formation, immediately above the Mississippian.

This new dual zone discovery well, on lands held jointly by Phillips Petroleum Co. of Oklahoma and Husky Oil & Refining, Ltd., is Phillips-Husky 1 Marengo, LSD 10, 26-28-27w3, 23 miles west-southwest of Kindersly and 18 miles southwest of Smiley-Dewar area Viking oil wells.

The detrital chert was topped at 2,897 ft., or 436 ft. subsea, and first drill-stem test in that formation was run from 2,932-47 ft. When pipe was pulled it was found to contain 1,050 ft. of heavy gas-cut clean black oil and 30 ft. of slightly oil-cut mud. Gravity of the oil is 13.7°. Drilling is continuing below 3,160 ft. In the Viking, the Marengo well had drill-stem tested and flowed gas at rates in excess of 1,500,000 cu. ft. daily. Top of the Viking was found at 2,478 ft.

EASTERN CANADA

Gaspe . . . In the Gaspe Peninsula, Quebec Province, The 2 Bald Mountain, at 6,168 ft. is fishing for bailer lost while cleaning out a shot hole. Continental 1 deep test is fishing for sand pump at 3,235 ft. The 1 Asphalt base is in softer formation below 2,035 ft. with steady oil production from the upper horizons. The 1 Tar Point is running casing and equipping well for shut-in pressure tests of the gas flow at 7,069 ft.

ILLINOIS

In White County 5 miles west of Carmi, The Texas Co. 1 Raymond Moore, 7-5s-9e, is shut down for tank space after flowing 99 bbl. of oil in 6 hours through ½-in. choke from the McClosky lime after acid treatment.

In Gallatin County 3 miles northwest of Omaha George Wrather 1 Howell H. Pankey, 20-7s-8e, is flowing oil at the rate of 340 bbl. per day after fracturing the Cypress sand at 2,669-77 ft. This discovery is 1 mile from other production.

Recovery on a test of the Rosiclare lime at 2,905-10 ft. was 250 ft. of clean oil at C. E. Brehm 1 Henry I. Kent, 11-3s-3e, Jefferson County. This apparent hit is 2 miles from other producttion and 4 miles southeast of Mount Vernon.

MICHIGAN

Credit a new discovery well to Don Rayburn for Skeels field, Clare County. His 1 Meyer, N½ NE SE 25-20n-3w, Franklin Township, a deeper horizon wildcat in this older field (one well now abandoned), was reported to be flowing oil at the rate of 55 bbl. per hour, and to be flowing harder by the hour, after a 5,000-gal. acid treatment to three perforated oil pays from 5,075-5,225 ft. Well swabbed and flowed as much as 60 bbl. of oil in 12 hours natural. Hole was drilled to 5,269 ft., total depth.

Not only was the 1 Meyer flowing hard from the Richfield to win discovery rating after conclusion of production tests, but at the Rayburn 1 Frier, N½ SW SE 25-20n-3w, the diagonal southwest 40-acre offset to the Meyer, a Richfield oil pay was en-

Photo:
Lake Shore Pipe Line, courtesy of the Lake Shore Gas Company of Ashtabula, Ohio.

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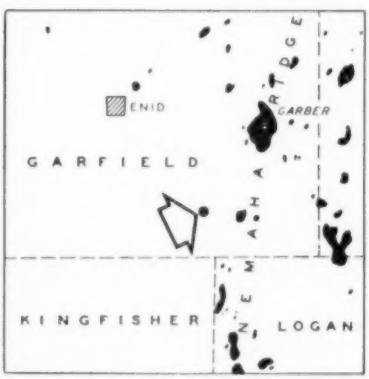
countered, which on the basis of preliminary tests appears to be even better than the one found at the 1 Meyer. A drill-stem test was run at the 1 Frier in the upper Richfield at 5,055-99 ft. Gas showed in 4 minutes and before tool had been opened an hour, well started to head up and try to flow. Even after testing was suspended, the well continued to try to flow, and heavier drilling mud was mixed to allow for additional coring in the Richfield before testing further. First cores in the Richfield at the 1 Frier were cut at about 5,048-99 ft. Of this section, about 25 ft. showed to be good dolomite pay.

OKLAHOMA

Garfield Discovery Has Very High Flow Rate

Flow tests at a Garfield County discovery well west of the Nemaha ridge in the NE NW NE 2-20n-5w are proving the Misener sand as a highly prolific pay.

The pool opener is George J. Greer, trustee, and San Juan Drilling Co. 1 Hammer. Logs indicated the Misener sand pay at 6,646-60 ft. On a short time interval the rate of flow at the well was 127 bbl. per hour calculated through 1-in. choke. Another flow test was rated at 103 bbl. per hour. More gages are being taken.



Arrow indicates George J. Greer, trustee and San Juan Drilling Co. 1 Ruth L. Hammer, NE NW NE 2-20n-5w, Garfield County Misener sand discovery well, which reported a calculated flow of 127 bbl. of oil per hour through 1-in. choke. The highly promising strike lies just west of the Nemaha granite ridge.

Two Wells at New Woods County Pool Completing

Woods County in northwestern Oklahoma, only recently opened to oil production, is back in the news with the report that two wells are completing and one drilling in new Yellowstone pool.

Champlin Refining, O'Donnell, NE SE SW 17-29n-17w, is swabbing and testing. Recovery on a drill-stem test of perforations at 6,100-47 ft. was 19 ft. of acid water and 1 ft. of distillate. Unconfirmed reports stated that the well flowed 25 to 27 bbl. of oil per hour from the Arbuckle, which was topped at 6,010 ft. Before casing was set a drill-stem test at 6,005-60 ft. flowed 6,924 M.c.f. of gas per day and flowed an unestimated amount of distillate.

The 1 George Dyer, NE SE NW 17, has 7-in. casing set at 6,299 ft. More than 1,000

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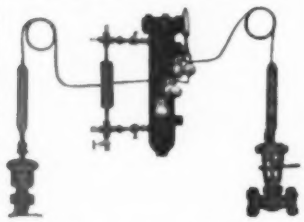

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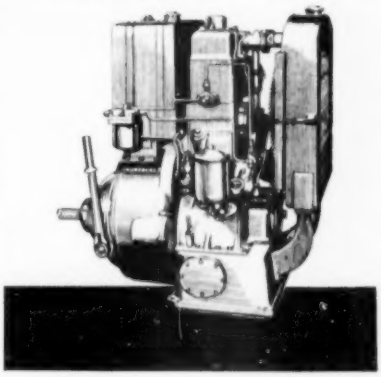

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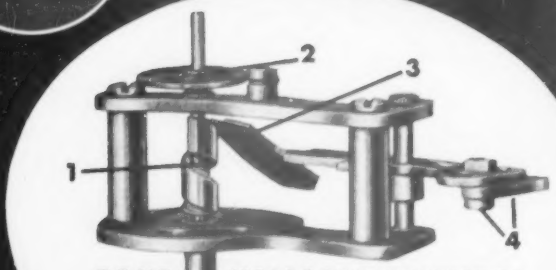

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M.c.f. of gas per day was reported as the flow from a drill-stem test at 5,950-68 ft. in the Simpson. Recovery was 105 ft. of oil and 810 ft. of salt water. Up the hole a test at 5,946-53 ft., open ½ hour, flowed gas up to 4,500 M.c.f. per day, and recovery was 10 ft. of heavily oil and gas-cut mud.

The new well in the area is Champlin Refining Co. 2 O'Donnell, NE SE SE 18-29n-17w. The discovery well of the new Yellowstone pool was completed for 25½ bbl. of 43°- gravity oil in 24 hours by heads with 3.7 per cent salt water from perforations in the Arbuckle at 6,134-40 and 6,149-52 ft. Flow was natural. The discovery also had good indications of production in the Simpson and Viola. This strike is considered by many as the most important strike in Oklahoma in 1953.

Centrahoma Pool Well Reports High Flow

Centrahoma pool in Coal County, southeastern Oklahoma, has a new good well assured at Carter Oil Co. 3 Thompson, NE NE NW 34-2n-9e. The well made 68 bbl. of oil in 45 minutes and 1,300 M.c.f. of gas per day on drill-stem test taken at 6,895-6,910 ft. Pay is the Oil Creek sand. Twin Oil Corp. 1 Harrington, NE SE SE 28-2n-9e, is readying for production tests in the Oil Creek after the well flowed at the estimated rate of 75 bbl. of oil per hour.

Third Well at North Jarvis Pool Has Show

The third well in new North Jarvis pool, Grant County, northern Oklahoma, found a good oil show in the upper lime. Union Oil Co. of California 1 Conrady, NW NW SW 28-29n-6w, is drilling ahead to the Simpson after making a drill-stem test in a lime believed to be of the Skiatook group of the Missouri series. Some gas showed at the surface in 1 hour and 30 minutes. Recovery on the test was 5 ft. of heavily oil and gas-cut mud, 200 ft. of mud-cut oil and 40 ft. of slightly mud-cut oil. The pay in the new field is Simpson. The objective of this well is the Simpson at about 4,266 ft.

APPALACHIAN AREA

OHIO

One of the best results of sand fracturing in the Pennsylvania Grade areas was Preston Oil Co. 1 W. H. Love, Section 32, Madison Township, Perry County. Clinton sand at 3,208-3,247 ft. filled up 1,600 ft. natural, and made 337 bbl. with 200,000 cu. ft. gas in 24 hours after treatment.

A north extension to Layland pool was completed by Palmer Drilling Co. on 1 Chas. D. Hoxworth, Section 25, Killbuck Township, Holmes County. Clinton at 3,329-3,382 ft. had two pays and made 50 bbl. in 24 hours after fracturing.

Eagon and Robison 1 C. E. Moore, Section 4, Pike Township, Perry County, a ⅓ mile step-out, made 300 bbl. and 200,000 cu. ft. after fracturing sand found at 3,127-3,185 ft.

WEST VIRGINIA

In Roaring Creek district, Randolph County, West Virginia, Blaho Oil & Gas Co., completed 1 Avington & King wildcat, elevation 2,508 ft., gaging 1,147,000 cu. ft. gas, Fifth sand 2,118-2,148 ft., gas 2,128 ft., TD 2,271 ft. The 1 H. E. Harshbarger, is drilling at 2,408 ft. Fox-Trimble 1 J. T. Brennan at 1,065 ft. and Washington Oil Co. 1 J. E.

Hanifan et al, 2,439 ft. Licking district, Tucker County, Snee & Eberly 1 W. H. Blair, is drilling at 435 ft., and in St. George district, Natural Resources Corp. 1-2 Tucker County Court is at 4,041 ft.

Buffalo Township, Washington County, Southwest Pennsylvania, Washington Oil Co. 1 Kelly & Southerland, recorded the top of the chert at 6,819 ft., and is drilling at 6,888 ft.

TEXAS

TEXAS PANHANDLE

Gas Discovery Finaled In Hansford County

Humble Oil & Refining Co. 1 Jackson, 3½ miles north of Hansford and 10 miles southeast of nearest gas production in Hugoton field, flowed 6,000,000 cu. ft. of gas a day on potential test, through 20/64-in. choke. Tentative identification of the pay sand was the Douglas, which made a high flow of gas on drill-stem test between 4,967-5,000 ft. Total depth of the well was 9,118 ft., plugged back to 5,000 ft.

A second pay section, identified as Morrow sand (Pennsylvanian) produced 2,680,000 cu. ft. of gas a day through ⅜-in. choke, on test between 6,216-40 ft. Recovery on the test also included 4½ bbl. of high gravity distillate.

Another Hansford County wildcat being watched is Humble 1 Collier, located 5 miles southeast of Hitchland, an old well drilled deeper from 4,509 ft. Unconfirmed reports on a drill-stem test in Douglas sand between 4,643-4,709 ft. showed a recovery of 170 ft. of heavily oil and gas-cut mud, plus 120 ft. of mud-cut oil. At 4,643-73 ft. recovery was 30 ft. of mud-cut oil and 240 ft. of free oil, plus a small amount of salt water. Operators were drilling ahead below 6,081 ft.

The Texas Co. 1 Blakemore, 10 miles northeast of Hansford, completed as a gas discovery from the Morrow sand. Total depth was 10,010 ft., plugged back to 7,399 ft. Potential was 6,850,000 cu. ft. of gas a day.

WEST TEXAS

Further Wolfcamp Oil Indicated for Gaines

Gaines County operations for the week included the completion of a Wolfcamp and Devonian discovery in the northwest corner, and in the south-central portion, another Wolfcamp producer was indicated.

O. D. Alsabrook 1 Riley finished as a discovery well from both pay sections. Potential from Wolfcamp perforations between 9,160-9,224 ft. was 361 bbl. of oil a day through ⅜-in. choke. Potential from the Devonian was 681 bbl. daily through ½-in. choke from pay at 11,132-11,185 ft. Tentative formation tops were Wolfcamp at 9,035 ft. and Devonian at 11,150 ft. The latter top was from samples.

The county's new prospect is The Texas Co. 2 Tobe Foster, 2½ miles northeast of a lone Wolfcamp producer and discovery of Bottonfield, and 7 miles northwest of a recent Wolfcamp extension to Nolley pool. First test at 9,198-9,296 ft. had gas at the surface and recovered oil with salt water.

A 2-hour test between 9,315-33 ft. had gas in 15 minutes and recovered 8,444 ft. of 35° oil, plus 90 ft. of salt water. Operators drilled to 9,380 ft. for another test.

Midland County . . . William Herbert Hunt 1 Windham-Gulf, Pennsylvanian discovery 3 miles northeast of similar production in Pegasus field, gaged 236 bbl. of oil a day from pay at 10,416-10,444 ft. and was ready for completion. The test was through ⅝-in. choke. Tentative top on the Pennsylvanian was 10,245 ft. A previous test on perforations between 10,373-14,400 ft. flowed oil at the rate of 40 bbl. hourly. Location is about midway between Pegasus and Magnolia Petroleum Co. 1 Parks, recent Pennsylvanian discovery south of Parks-Pennsylvanian pool.

In southwest Midland County, Reynolds Mining Corp. 1 Roy Parks, which up to this report was drilled tight, had flowing oil from the Bend section of the Pennsylvanian, and had logged oil shows in the Dean, Wolfcamp and Strawn.

On first test of the Bend section at 10,167-10,205 ft., oil surfaced in 54 minutes. It cleaned into pits for 10 minutes, then tanked 53 bbl. of oil in 1 hour. Flowing pressure was 1,950 psi.

Sectond test from 10,215-10,235 ft. returned gas and gas-cut mud. It was drilled ahead to 10,531 ft. to set casing. Other shows were on tests of the following sections: From 8,922-9,063 ft. in the Dean sand of lower Permian age, recovery included oil-cut mud; recovery from the Wolfcamp at 9,156-82 ft. was estimated to be 50 per cent oil, and in the Strawn at 9,799-9,840 ft. recovery was gas and gas-cut mud.

Andrews County . . . The northeast corner of this county had another Ellenburger structure in sight at Stanolind Oil & Gas Co. 1-BN University, Section 8, Block 5, University Lands Survey. Location is 14 miles northeast of Andrews and about 3½ miles south-

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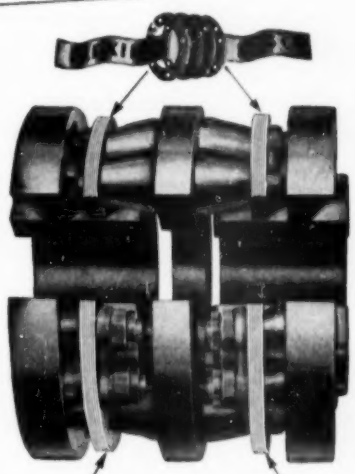

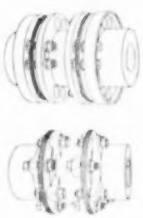

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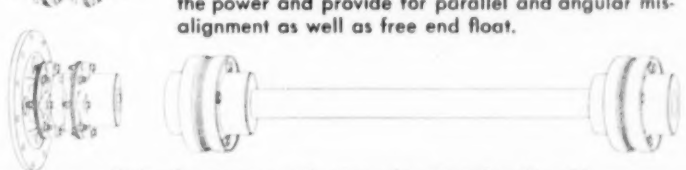

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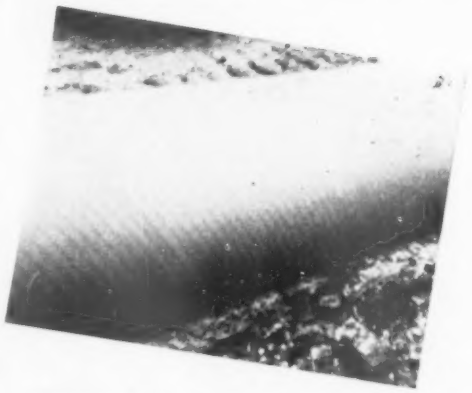

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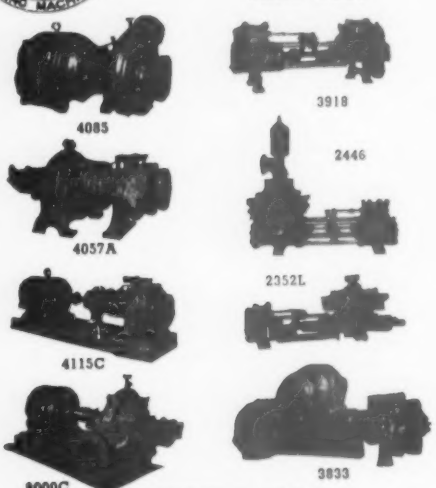

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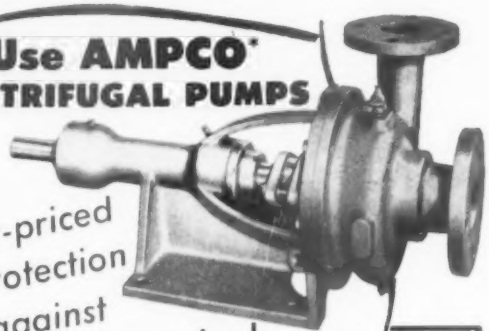

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west of L. M. Glasco 1 Butler, recent Devonian discovery.

Tentative Ellenburger top was 13,930 ft., and drill-stem test between 13,953-13,978 ft. recovered 4,410 ft. of gas, 20 ft. of clean oil, oil-cut water blanket, plus 2,160 ft. of heavily oil and gas-cut mud. Operators prepared to core ahead and continue testing.

Delaware Basin . . . Gulf Oil Corp. and Phillips Petroleum Co. will have another go at the deep beds of the basin which will be drilled as 1 Mrs. V. L. Shurtleff, Section 20, Block C-17, PSL Survey, Reeves County. Location is 12 miles west of Pecos and projected depth was 14,000 ft.

TEXAS GULF COAST

New Gas-Distillate Area Opened in Harris County

A new gas-distillate producing area, located 4 miles southeast of Tomball, in northern Harris County, has been opened with the completion of Newman Brothers Dilling Co. and Geotek Oil Co., joint operators, of their 1 Neuhaus. Location is 1½ miles southeast of Tomball production.

The well, tested through various chokes, flowed at the rate of 1,661,000 cu. ft. of gas daily with distillate yield at the rate of 8 bbl. per million cubic feet. Open flow potential was placed at 4,180,000 cu. ft. of gas per day.

Northeast of the new discovery well in Huffsmith field, R. W. Ramey has completed another good producer at his 4 Jones. The well flowed 135.37 bbl. of 36°-gravity oil daily through 8/64-in. choke with 725-psi. pressure on the tubing. Production is from casing-perforated interval at 5,866-68 ft. Total depth is 5,911 ft.

SOUTHWEST TEXAS

Second Well Indicated In New Reynolds Area

The new oil field opened early in November by Inca Drilling Co. two miles southeast of Orange Grove and a mile north of Reynolds field, in Jim Wells County, is virtually assured of its second producer, north offset to the discovery well.

The confirmation well, drilled by LaGloria Corp., recovered 1,410 ft. of clean oil in a drill-stem test in the discovery well's pay zone at 4,787-97 ft. Tester was open only 15½ minutes through ⅝-in. and 1-in. chokes. Flowing pressure ranged from 785 to 815 psi.

This well, 2 Miller, is 990 ft. south of a dry hole, 1 Miller, previously drilled by the same operator. Inca's discovery well, 1 Miller, flowed 100 bbl. of 30.3°-gravity oil daily through 10/64-in. choke at completion from sand interval at 4,787-91 ft.

KENTUCKY

EASTERN KENTUCKY

An especially good well for Big Sandy gas field has recently been completed by Colombian Fuel Corp. at their 3 Lon B. Rogers on Caney Fork of Turkey Creek in the Pike County sector of the field. The Devonian black shale gaged 3,130,000 cu. ft. of gas daily from 3,485 to 3,516 ft. Total depth of hole is 3,519 ft.

In the Floyd County sector of Big Sandy gas field, Grover Lowe has completed 1 Jack Derossett for 343,000 cu. ft. of gas daily from Maxon (Mississippian) sand at a total depth of 1,093 ft. Well is located on Bull Creek.

Okadee
"THE PERFECT SEAL"
WRING FIT

No magic . . . No magnetism . . . lapped wring fit of every Okadee Valve disc and seat must pass this test of a perfect sealing surface. (unretouched photo)

. . . Here's What it Means to You in Terms of Valve Service

Flat mating surfaces within .000005", or less, of every set of Okadee valve discs and seats mean absolute shut-off of any material from ammonia gas to asphalt.

How long does this seal last in service? We honestly don't know. Tests under working conditions with propane were stopped after 269,000 operating cycles when no wear or seal failure could be detected. And Okadee valves do not have to be babied in service on corrosive or abrasive materials . . . Thousands of boilers have had Okadee blow-down valves in continuous, trouble-free service for fifteen years or more. If Okadee size-pressure-temperature ranges include your valve applications, Okadee installation will end your problems of valve performance once and for all.

Okadee valves are available in single-disc (one direction) and double-disc (two directions) types; screwed or flanged; ½" to 6" in standard A.S.A. dimensions; steel or semi-steel bodies (other materials to order); stainless steel or stellite seat facings; levers, rack-and-lever, worm-gear, hydraulic, pneumatic, automatic on-off control.

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Stand lifts, holds, tilts 55 gal. barrels. Prevents spillage—easily loaded.

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Aransas County: Geo. W. Graham & Emory M. Spencer 1 Sellers Mineral Fee, John Smith Sur. A-187. Dry. TD 8,015 ft.

Atascosa County: Drilling & Exploration, Inc. 1 Wilkins Texas Corp., Maria Dolores Diaz, A-189. IPF 8 BOPD, top pay 3,450 ft., open hole 3,450-70 ft., 38.5°, TD 3,470 ft. (Oil discovery.)

Bastrop County: Tenway Oil Co. 1 Betty Moore, Reuben Gage. Dry. TD 2,120 ft.

Bexar County: F. E. Welborn, Jr. 1 Beam, San Antonio Ditch Colony 419. Dry. TD 765 ft.

Duval County: J. P. Bristow & Co., 2 W. R. Peters D, T. A. Cavitt Sur. 34, A-1704. Dry. TD 4,013 ft.

Frio County: Chas. G. Dunwoody, Jr. 1 White, J. A. Barrera III, A-49. Dry. TD 5,460 ft.

Jim Hogg County: Geo. H. Coates A-2 Silver Lakes Ranches, Rankin Subd. El Sordo Grant, A-326. Dry. TD 4,435 ft.

Milam County: D. H. Byrd 2 Blakeley, A. J. Watt. Dry. TD 7,806 ft.

Nueces County: Conroe Drilling Co. 1 Smith, Flour Bluff & Encinal Farm & Garden Trs. Dry. TD 7,014 ft.

C. G. Glasscock 1 St. Tr. 327, Redfish Bay. Dry. TD 9,020 ft.

Theo. Hamm Brewing Co. 1 Yakey, Agua Dulce Farm Lots. Dry. TD 6,000 ft.

Starr County: Rowan & Hope 4 Bentsen Bros., CCSD&RGNG 549. IP 10,000 M.c.f. of gas per day, open flow, top pay 8,670 ft. TD 9,516 ft. (New pay in La Copita field.)

Travis County: Otto A. Wolter 1 Leissner, W. J. Lewis. Dry. TD 832 ft.

Val Verde County: Phillips Petroleum Co. 1 Fawcett Ranch, GWT&P Blk. F. Core hole. Dry. TD 4,950 ft.

Phillips 2 Fawcett Ranch, W.F.D. Barnett Sec. 5, core hole. Dry. TD 2,915 ft.

Phillips 1 Harvey E. Quinn, Blk. DB, Sec. 4. Core hole. Dry. TD 2,500 ft.

Webb County: Blanco Oil Co. and Sid Katz 1 Killam-Bruni, Blk. 63, Brown Subd. Albercas Grant. Dry. TD 6,188 ft.

G. G. Mortimer, Jr. 2 Adami, H&GN 913. Dry. TD 920 ft.

Zapata County: Dulaney Oil Co. 3 Amalia De Velva, El Grullo Grant. Dry. TD 3,368 ft.

T. C. Huddle 1 Paula V. de Garza, Charco de la India Grant. Dry. TD 3,333 ft.

TEXAS GULF COAST

Bee County: Willard Shuart 1 Gillette, J. Poitevent Sur., A-430. Dry. TD 4,614 ft.

Brazoria County: Brazos Oil & Gas Co. 2 Houston Farms, Pierce Miller Sur., A-348. IP 48,500 M.c.f. daily, open flow, casing perforations 6,520-24 ft. TD 7,200 ft. (New field—Alligator Point.)

DeWitt County: Holly Development Co. and H. J. Chavanne, trustee, 1 Gohlke, W. W. Stubblefield Sur., A-425. Dry. TD 8,479 ft.

Harris County: Brewster-Bartle Drilling Co., Inc., 1 Peter, D. D. Culp Sur., A-810. Dry. TD 8,557 ft.

J. R. Butler 1 Field, H. Sanders Sur., A-753. Dry. TD 8,150 ft.

The Texas Co. 1 Fehrle, F. Basquez Sur., A-136. Dry. TD 7,100 ft.

Carnes W. Weaver 1 Cook, Sec. 47, H&TC Sur., A-440. Dry. TD 7,620 ft.

Jasper County: H. J. Porter et al 1 Spencer, J. T. White Sur., A-339. Dry. TD 5,675 ft.

Lavaca County: Geochemical Surveys, Inc., 1 Patek, Henry Myers Sur. 514. Dry. TD 9,210 ft.

Liberty County: General Crude Oil Co. 1

WILDCAT COMPLETIONS

Grayburg, Edward Tanner Lge., A-353, Dry. TD 9,017 ft.

Trinity County: R. W. Ramey 1 Abercrombie, William Beardsley Sur., A-77, Dry. TD 3,637 ft.

Victoria County: Carrl Oil Co. et al 1 Leskiker, Movry Irwin Sur., A-185, IP 33,000 M.c.f. daily with 1.4 BC per million, open flow, 56.8#, casing perforations 5,879-85 ft. TD 6,510 ft. (New field.)

W. H. Cocke and R. H. Goodrich 2 McCormick, SA&MG Sur. 5, A-316, IP 400 M.c.f. daily, open flow, casing perforations 641-47½ ft. TD 647½ ft. (New field—East Nursury.)

EAST TEXAS

Camp County: J. K. Maxwell 1 Hedrick, J. M. Henrie Sur. A-50, Dry. TD 3,950 ft.

Henderson County: Mack Hays and Eugene Talbert 2 Bauguss, James M. Gardner Sur. Dry. TD 3,304 ft.

Navarro County: C. H. Scott 1 Weaver, W. H. Hardeman Sur., A-345, Dry. TD 1,890 ft.

Smith County: L. A. Grelling and American Liberty 1 Forks, Ben Lafferty Sur., A-13, IPP 68.6 BOPD, 41°, Woodbine 4,008-10 ft. TD 4,521 ft.

Wood County: B. B. Orr 1-A Miller, J. H. Blackstock Sur., A-46, Dry. TD 4,000 ft.

TEXAS PANHANDLE

Parmer County: Gulf Oil Corp. 1-A Kelichor, Sec. 5, Brown Subd., Gregg County School Land Sur. Dry. TD 9,628 ft. Elev. 3,996 ft., Abo 5,440 ft.

WEST CENTRAL TEXAS

Callahan County: M. D. St. John 1 Lilley, 149-2-GH&H, Dry. TD 4,152 ft.

Coleman County: M. H. Halff 1 Tabor, Blk. 39, Wm. Doran Sur. 666, Dry. TD 1,818 ft.

Miami Operating Co. 1-B Whitley, 3-2-ELRR. Dry. TD 3,818 ft.

Comanche County: Felmont Oil Corp. 1 Callaway, Sec. 60, D&DA Sur. Dry. TD 3,446 ft.

Fisher County: Richardson & Bass 1 Schwalbe, 173-3-H&TC, Dry. TD 7,158 ft.

Haskell County: Thos. D. Humphrey & Son 1-A Bush, 15-14-H&TC, Dry. TD 5,110 ft.

Jones County: Robinson-Puckett and American Liberty 1 Ward, Sec. 42, BBB&C Sur. IPP 111 BOPD, Cook sand 2,527-33 ft. TD 2,581 ft.

Nolan County: General Crude Oil Co. 3 Ussery, 42-5-T&P. Dry. TD 5,870 ft.

Palo Pinto County: I. O. Shaw 1 McClure, Sec. 1728, TE&L Sur. IPP 16 BOPD, pay 1,376 ft. TD 1,383 ft.

Shackelford County: G. E. Kadane & Sons 1-B Green, Sec. 28, BAL Sur. TD 3,105 ft.

Stephens County: Aljon Oil Co. 2 Fambro, 34-6-T&P. Dry. TD 1,830 ft.

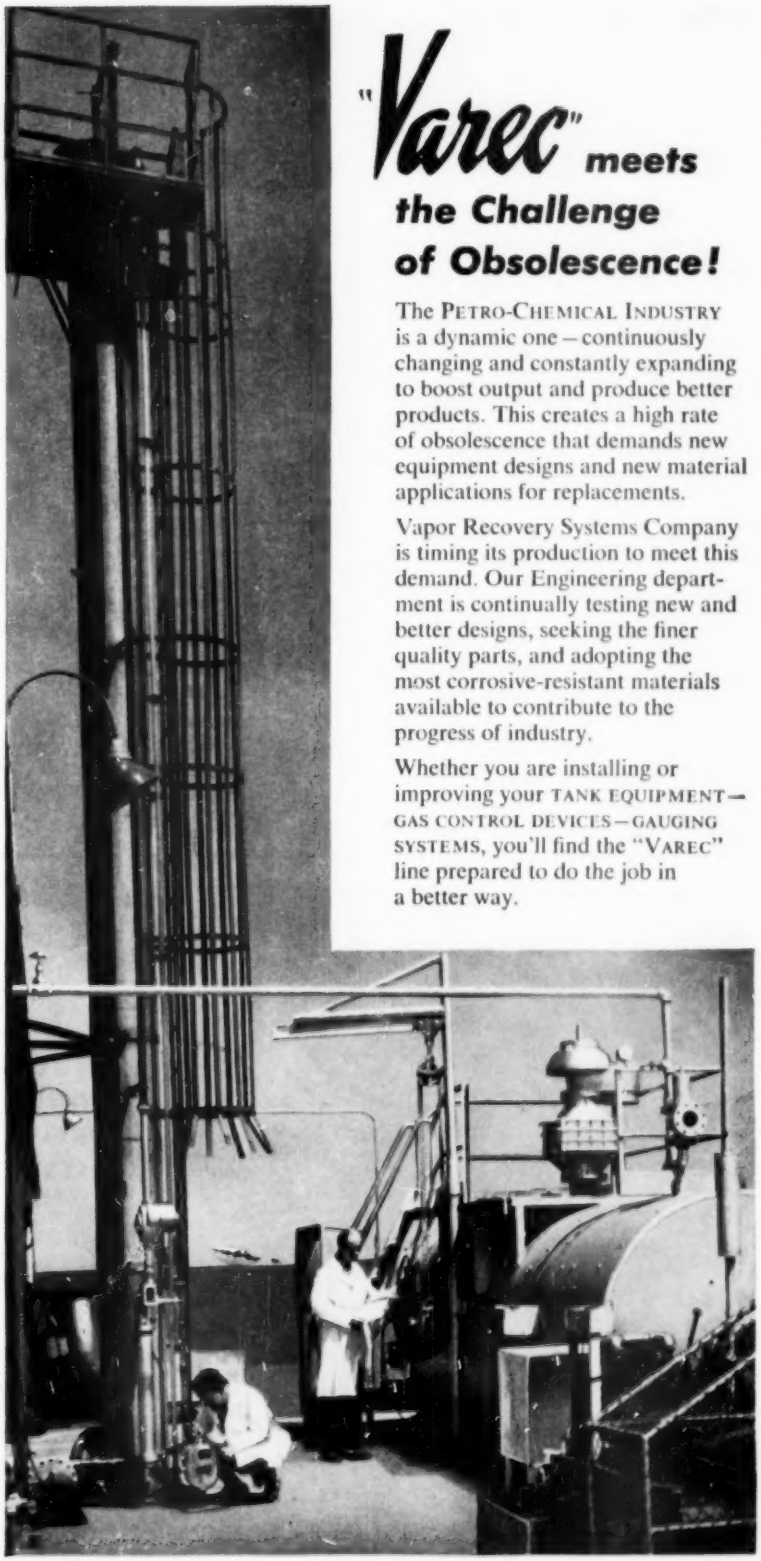
Throckmorton County: Burk Royalty Co. 1 Parmenter, Sec. 283, BBB&C Sur. IPP 100 BOPD, 40°, pay 4,300-07 ft. TD 4,573 ft.

Henson Drilling Co. 1-E Stella Zimmerman, Sec. 2219, TE&L Sur., A-629, Dry. TD 4,816 ft.

NORTH TEXAS

Archer County: Paul Bilbrey and Wayne Albritton 1 Duckworth, Blk. 9, J. W. Harris Subd. Dry. TD 1,222 ft.

Bilbrey and Albritton 2 Duckworth, Blk. 11, Harris Subd. Dry. TD 1,216 ft.



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WILDCAT COMPLETIONS

S. F. Hutcheson 1 Grady Bars, Blk. 146, Harris Subd. Dry. TD 1,433 ft.

G. E. Kadane & Sons 1-B Reilly & George, J. Sladen Sur. Dry. TD 5,415 ft.

Panhandle Oil Corp. 1 Prideaux, S. McKimbs Sur., A-693. Dry. TD 3,750 ft.

Baylor County: Cosden Petroleum Corp. 3 Hunt Ranch, Colorado CSL Sur., A-134. Dry. TD 5,550 ft.

Clay County: Armour Properties 1-A Nuckolls, TE&L Sur. 3229. Dry. TD 4,226 ft.

L. T. Burns 1 Cora Gilbow, Blk. 33, Grayson CSL, A-176. Dry. TD 4,950 ft.

Tom B. Medders 1 Ross heirs, Blk. 6, J. Wyont Sur., A-903. Dry. TD 4,957 ft.

Panhandle Oil Corp. 1 W. E. Cox, TE&L Sur. 3277. Dry. TD 4,500 ft.

Grayson County: Superior Oil Co. 1 Westbrook, M. B. Lamar Sur., A-704. Dry. TD 7,565 ft.

Seitz, Comegys & Seitz 1 Suiter, Joseph Bratton Sur., A-131. Dry. TD 5,801 ft.

Jack County: M. W. Blair 1 Lucille Gowdy, D. D. Brown Sur., A-1778. Dry. TD 4,475 ft.

Taubert & Harper 1 Kinder, E. Pearce Sur., A-467. Dry. TD 3,147 ft.

Warren Petroleum Corp. 1 Maude Copeland, Lot 5, Patton Subd. Dry. TD 3,989 ft.

Warren Petroleum 1 Parish, Nancy Overby Sur., A-452. Dry. TD 3,303 ft.

Knox County: Humble Oil & Refining Co. 2-S Waggoner, 33-C-H&TC. Dry. TD 6,392 ft.

Skelly Oil Co. 1 Michels, 66-2-D&W Sur. IP 115 BOPD, 24/64-in., 30°, conglomerate 5,713-25 ft. TD 5,822 ft.

Montague County: P-M Drilling Co. 1 Collier, J. Collier Sur., A-1213. IP 243 BOPD, 16/64-in., 42°, conglomerate 6,652-70 ft. TD 7,013 ft. (New field.)

John Shipler 1 Cunningham, Blk. 7, Kaufman CSL. Dry. TD 1,780 ft.

John Shipler 1 Gregory, D. D. D. Baker Sur. Dry. TD 3,410 ft.

Wichita County: S. H. Walton 28 Coleman, Sec. 23, Blk. 1 and 2, H&GN Sur. IPP 9 BOPD, 40°, pay 609 ft. TD 4,000 ft.

Wilbarger County: E. G. Boardman 1-K Pounds-Waggoner, 17-4-H&TC. IPP 6 BOPD, pay 2,406 ft. TD 2,424 ft.

Dublin-Kiel 1-J Waggoner, 8-17-H&TC. Dry. TD 2,001 ft.

New Sevel Falls Co. 1 Neal, 36-11-H&TC. Dry. TD 5,220 ft.

Young County: Bay Petroleum Co. 1 Emma Ward, Blk. 279, TE&L Sur., A-526. Dry. TD 4,894 ft. Mississippian 4,894 ft., elev. 1,188 ft.

Bilbrey & Albritton 1 Johnson, Blk. 25, TE&L Sur., A-301. Dry. TD 768 ft.

E. S. Brashear 1 Dan Johnson, Blk. 25, TE&L Sur., A-301. Dry. TD 756 ft.

P. C. Brashear 2 Routon, Sec. 24, TE&L Sur. Dry. TD 750 ft.

Consolidated Oil Co. 1 Donnell, Margaret Edmonds Sur., A-91. Dry. TD 3,116 ft.

Dudley T. Dougherty 1 Freeman, T&NO Sur. 9, A-1245. IP 85 BOPD, 17/64-in., Strawn 3,466-80 ft. TD 4,736 ft.

Fryer Hansen Drilling Co. 1 Evans, G. W. Cottle Sur., A-65. Dry. TD 4,500 ft.

Hale Brothers and Lion Oil Co. 1 Stovall, Sec. 732, TE&L Sur., A-737. Dry. TD 3,007 ft.

E. R. Perkins 1 Meredith, TE&L Sur. 213. Dry. TD 847 ft.

WEST TEXAS

Andrews County: Buffalo Oil Co. 1-2 Fasken, 37-41-T2N-G&MMB&A. Dry. TD 9,210 ft. Elev. 3,057 ft., Pennsylvanian 9,168 ft.

Cities Service Oil Co. 1-AT University, 26-10-University Lands Sur. Dry. TD 12,729 ft. Elev. 3,211 ft., Devonian 10,568 ft., Silurian 11,200 ft., Ellenburger 12,694 ft.

Crockett County: Continental Oil Co. 1 University, 13-32-University Lands. Dry. TD 10,014 ft. Elev. 2,529 ft., Ellenburger 9,644 ft.

Crosby County: Lockhart & Wooley 1 Greenfield, 11-4-WCRR. Dry. TD 3,210 ft.

El Paso County: W. D. Watkins and Hugler Drilling Co. 1 J. R. Davis, 21-7-PSL, 25 miles E El Paso. Dry. TD 1,550 ft.

Garza County: Jim Lee Drilling Co. 1 Williams, Sec. 1419, Blk. 1, EL&RR. Dry. TD 9,007 ft.

Glasscock County: Bond Oil Corp. 1 Ben Shaeffer, 36-33-T3S-T&P. Dry. TD 3,035 ft.

Mitchell County: W. J. Rasnick 3 Elwood estate, 4-16-SPRR. Dry. TD 5,096 ft.

Rasnick 4 Ellwood, 4-16-SPRR. Dry. TD 1,325 ft.

Rasnick 1 Price, J. Babcock Sur. 26. Dry. TD 6,813 ft.

Pecos County: Childress Royalty Co. 1 Humphreys, 79-OW-GC&SF Sur. Dry. TD 3,096 ft.

Houston Oil Co. 1 Ayres, 79-8-H&GN Sur. Dry. TD 10,518 ft.

G. D. Putman & Co. 1-C McDonald, 37-11-H&GN. Dry. TD 3,040 ft.

Runnels County: Herman Graham 1 Smith, 81-63-CTRR. Dry. TD 5,015 ft.

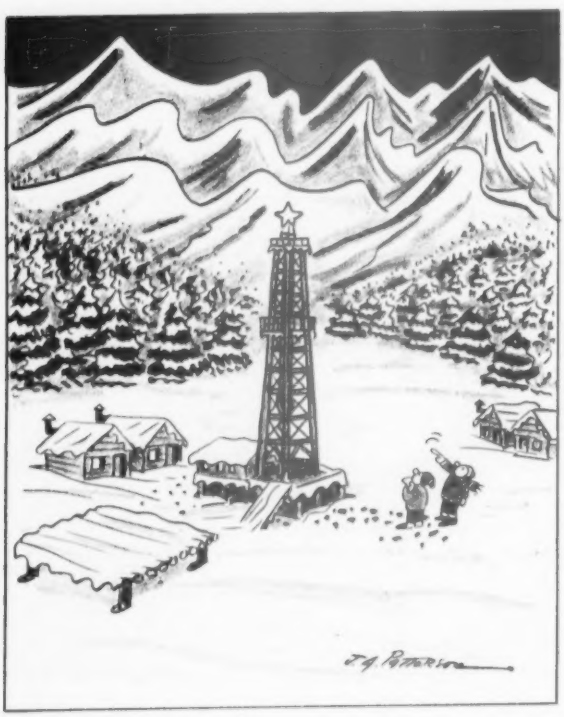
Thos D. Humphrey & Sons 1 Stann, Blk. 312, B. Sandoval Sur. Dry. TD 5,280 ft.

H. G. Lewis 1 Gentry, James A. Yearby Sur. 273. Dry. TD 4,320 ft.

Murray Petroleum Co. 1 Parish, Blk. 164, ETRR Sur. Dry. TD 4,545 ft.

Price & Austin 1 Middleton, Blk. 28, Domingo Diaz Sur. 532. IPP 25 BOPD, 45°, pay 3,567-77 ft. TD 4,100 ft.

Schleicher County: J. B. Rancle and T. W.



THE OIL AND GAS JOURNAL

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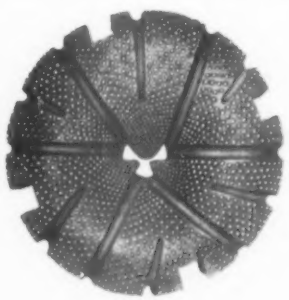

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TRUCO DIAMOND BITS AND D & S CORE BARRELS

Murray 1 Judkins, 16-A-GH&SA. Dry, TD 5,624 ft.

Scurry County: The Texas Co. 6 Fuller, 6-5-97-H&TC. Dry. TD 3,025 ft.

Sterling County: Big Spring Exploration Co. 1 Reed, 22-14-SPRR. Dry. TD 1,950 ft.

Sutton County: C. P. Burton 1 Miers, 74-B-HE&WT. Dry. TD 7,908 ft. Elev. 2,234 ft., Ellenburger 6,840 ft., Wilburns 7,742 ft., Hickory 7,840 ft.

Tom Green County: Stanolind Oil & Gas Co. 1-A Johnson, C. M. Dunn Sur. 546. IP 69 BOPD, 20/64-in., 47°, Palo Pinto 4,640 ft. TD 5,782 ft.

SOUTHEAST NEW MEXICO

Lea County: John M. Kelly 1-A Gulf-State, 35-22s-35e. Dry. TD 4,350 ft.

NORTHWEST NEW MEXICO

Rio Arriba County: El Paso 4 San Juan Unit 27-4, SW NE NE 31-27n-4w. IP 657 MCFGPD, Mesaverde discovery — new field. Point Lookout 5,847 ft. TD 5,960 ft.

ILLINOIS

Clinton County: Collins Bros. 1 Scheibel, NW NW NE 35-1s-5w. Dry. TD 2,122 ft.

Five G Oil Co. 1 Geary heirs, SE NE SE 10-1n-1w. Dry. TD 1,425 ft.

Hamilton County: Denzil Webster 1 Campbell-Ledford Community, SE NW SE 5-5s-7e. Dry. TD 3,607 ft.

Lawrence County: R. W. Harper Jr. 1 Staats-Preston-Hassell, SW SE SE 11-3n-13w. Dry. TD 2,265 ft.

Macon County: Lester Walker 1 Wheeler, NE NE NE 2-16n-3e. Dry. TD 2,328 ft.

White County: Ralph Halbert 1-A Ackerman, SW SE SE 3-6s-10e. Dry. TD 2,984 ft.

Calvert Drilling Co. 1 Burroughs, SE SE SE 15-4s-8e. Dry. TD 3,602 ft.

INDIANA

Dubois County: Ryan Oil Co. 1 Breitweiser, NE SW SW 16-1s-4w. Dry. TD 717 ft.

Ashland Oil & Refining Co. 1 Brames-Fleck, NW NW NE 20-2s-4w. Dry. TD 1,073 ft.

Gibson County: E. F. Moran 1 Knowles, NE NW SW 23-3s-13w. Dry. TD 2,914 ft.

C. S. Neer 1 Blood, NW NE NW 11-3s-13w. Dry. TD 2,453 ft.

Perry County: A. W. Bea 1 Shafer, 24-4s-4w. Dry. TD 450 ft.

Spencer County: Walter Sargent 1 Shrouds, SE SE NW 24-6s-6w. Dry. TD 1,476 ft.

Sullivan County: F. B. Cline 1 Burton, SW SW SW 4-9n-8w. Dry. TD 1,132 ft.

T & H Corp. 1 Shew, SE SW SE 2-8n-11w. Dry. TD 1,835 ft.

Vigo County: Reed & Able 1 Progou, SE NE SW 12-11n-9w Dry. TD 1,781 ft.

KENTUCKY

Henderson County: Felmont Oil Co. 1 Rudy, SW SW NW 10-Q-26. IPP 8 BOPD, Waltersburg 1,274-77 ft. TD 1,280 ft.

G. A. Hoffman K-37 Whitledge, WL NW SW NE 5-O-23. Dry. TD 2,702 ft.

Ryan Oil Co. 1 Sigler, SW SE NW NE 3-N-22. IPP 22 BOPD, sand 1,011-26 ft. TD 2,734 ft.

Hopkins County: The Texas Co. 1 Steedly, SW NE NW NW 16-K-22. Dry. TD 2,278 ft.

Meade County: O. D. Vickers and Thrasher 1 Wright, NE NW NW 22-R-40. Dry. TD 960 ft.

Muhlenberg County: Millard Haynes 1 (3) Jones, SE SE SW NW 6-H-30. Dry. TD 1,472 ft.

MICHIGAN

Grand Traverse County: The Carter Oil Co. 1 Schmidt, SE SE NE 25-26n-12w. Dry. TD 6,413 ft. below Niagaran

Huron County: Alvin H. Weber and Muskegon Development Co. 1 Blondell, NW NE NW 29-15n-11e. IPP 5 BOPD from Detroit River "sour zone" pay 3,358-60 ft. TD 3,918 ft. (new pool.)

Kalamazoo County: Ford Henry 1 Hall, NE NE SW 18-3s-12w. Dry. TD 1,362 ft., in Traverse.

WEST VIRGINIA

Randolph County: Roaring Creek district: Blaho Oil & Gas Co., 1 Avington & King, elevation 2,508 ft., 1,147,000 cu. ft. gas, after sandfrac, Fifth sand 2,118-2,148 ft., gas 2,128 ft., TD 2,271 ft.

ALABAMA

Escambia County: Lyle Cashion Co. 1 Jones trustee, NW NE SW 15-1n-12e. Dry. TD 5,993 ft. Elev. 181 ft., lower Cretaceous 5,713 ft.

MISSISSIPPI

Adams County: Jett Drilling Co. and Alexander-Norman 1 Newman-Montgomery, 54-6a-1w. Dry. TD 6,808 ft. Elev. 329 ft., Wilcox 4,500 ft., base Baker shale 6,332 ft.

H. L. Rowley 1 Stockfelt, 21-6n-2w. Dry. TD 6,526 ft. Elev. 341 ft., Wilcox 4,330 ft.

Jasper County: Como Drilling Co. 1 Wildham, 23-7n-11e. Dry. TD 6,012 ft. Elev. 413 ft., Wilcox 1,240 ft., Eutaw 5,203 ft., Tuscaloosa 5,670 ft.

Lamar County: Marshall R. Young 1 Powe, 28-3n-15w. Junked hole. TD 9,445 ft.

Perry County: Ed L. Merry et al 1 Masonite, 35-5n-9w. Dry. TD 7,092 ft. Elev. 232 ft., Chalk 5,382 ft., base Chalk 6,965 ft.

Smith County: San Juan Exploration Co. 1 Colev, 22-1n-9e. Dry. TD 7,866 ft. Elev. 505 ft., Tuscaloosa 6,876 ft., lower Cretaceous 7,810 ft.

Wayne County: E. T. Merry and Clinch Drilling Co. 1 U.S.A., SE SE NE 5-7n-8w. Dry. TD 6,190 ft. Elev. 285 ft., Chalk 4,850 ft., Eutaw-Stanley 5,795 ft.

SOUTH LOUISIANA

Acadia Parish: Amerada Petroleum Corp. 1 Roy et al, 21-11s-1e. Dry. TD 11,010 ft.

Assumption Parish: Stanolind Oil & Gas Co. 1 State Lease 2007, 29-13s-12e. Dry. TD 13,001 ft.

Calcasieu Parish: Houston Oil Co. of Texas 2 Fisher et al, 32-8s-13w. Dry. TD 7,517 ft.

Iberville Parish: J. M. Flaitz and R. B. Mitchell 1 Wilbert, 58-9s-11e. Dry. TD 11,288 ft.

Lafourche Parish: California Co. 2 Jones, 46-17s-21e. IP 312 BOPD, 16/64-in., 38.3° casing perforations 11,566-74 ft. TD 12,840 ft. (Extends, and new pay in Cut-off field.)

The Texas Co. 1 State-Authement unit 1, 15-21s-22e. Dry. TD 13,195 ft.

St. Landry Parish: Rainey-Hurley 1 Pardee, 7-7s-7e. Dry. TD 10,338 ft.

Southern Production Co., Inc., 1 Artall, 2-5s-7e. IP 144 BOPD, 8/64-in., 41°, casing perforations 10,364-70 ft. TD 11,143 ft. (New field.)

NORTH LOUISIANA

De Soto Parish: Midwest Oil Corp. 1 Atkinson near SWc 26-14n-15w. Dry. TD 5,408 ft.

Ouachita Parish: McCalman Drilling Co. 1 Filhoil "A," near NEc NW SW 5-15n-4e. Dry. TD 4,707 ft.

ARKANSAS

Arkansas County: Continental Oil Co. 1 Cunningham-core test, C SE SE SW 3-6s-2w. Dry. TD 4,607 ft.

WILDCAT COMPLETIONS

Ashley County: J. L. Perry et al 1 Crossett Lumber Co., C NE SE 9-18s-7w. Dry. TD 4,145 ft.

Union County: Texas Eastern Producing Corp. 1 Wilson, C W½ NW SE 15-18s-16w. Dry. TD 7,711 ft.

OKLAHOMA

Carter County: Goff & Leeper 1 Goldie, NW SW 7-4s-1w. Dry. TD 8,010 ft.

Comanche County: Geo. Blalock et al 1 Atan-Vick, SE SE SE 17-2-9w. Dry. TD 2,117 ft.

Garvin County: Westheimer & Neustadt 1 Snodgrass, SE NW NE 18-2n-1e. Dry. TD 5,640 ft.

Kay County: D&L and Russell Cobb 1 Elmore, NE NE SW 14-29n-2w. Dry. TD 4,070 ft.

Lincoln County: E. L. Oliver 1-A Burkett, SW SW NW 23-14n-2e. IP 2,000 M.c.f. of gas per day, Checkerboard 3,692-3,702 ft. TD 3,760 ft. (Gas discovery.)

Mid-Continent 1 Schmidt, SE SW NE 2-13n-5e. Dry. TD 3,600 ft.

Big Four Petroleum Co. 1 Smith, NE NE SE 18-15n-5e. Dry. TD 4,591 ft.

Logan County: Mid-Continent Petroleum Corp. 1 Murphy, NE NE SW 21-16n-1w. Dry. TD 5,813 ft.

Calvert Drilling Co. 1 Abrams, NE NE NE 9-17n-2w. Dry. TD 5,773 ft.

McClain County: K. A. Ellison 1 Johnson "B," C NW SW 11-8n-4w. Dry. TD 10,216 ft.

McCurtain County: Stanley A. Thompson 1 Whitten, W½ NE NE 3-8s-23e. Dry. TD 400 ft.

Osage County: J. R. Porter 1 Osage, NW NW SE 33-24n-3e. Dry. TD 4,141 ft.

Seminole County: H. H. Diamond 1 Patterson, SW SW SE 16-7n-7e. Dry. TD 4,442 ft.

Texas County: United Carbon 1 Beazley, C SE NE 17-1n-10eCM. Dry. TD 5,600 ftt.

KANSAS

Barton County: Honaker Drilling Co. 1 Haberman, NW NE NE 28-19s-13w. IPP 235 BOPD, Arbuckle 3,444-48 ft. TD 3,490 ft. (Oil discovery.)

Coffey County: Fees & Richards 1 Merritt, SW SW NE 32-22s-14e. Dry. TD 1,582 ft.

Cowley County: Fortier & Wright 1 Wadsack, SW SW SW 15-31s-5e. Dry. TD 3,030 ft.

Edwards County: Bay Petroleum Co. 1 Lippoldt, NW NW NE 18-23s-19w. Dry. TD 4,973 ft.

Graham County: Berwick, Hall & Jones 1 Neal NE NE SE 4-8s-24w. IPP 234 BOPD. Lansing-Kansas City 3,738-46 ft. TD 4,045 ft. (Opens Nana pool.)

McPherson County: Aro Equipment Corp. and NACC 1 Hemne, SE SE SE 5-18s-1w. Dry. TD 2,780 ft.

Johnson Bros. 1 Seidel, NW NE NW 13-19s-5w. Dry. TD 3,338 ft.

Trans Era and Nate Appleman 1 Smith, SW SW NE 28-20s-4w. Dry. TD 3,939 ft.

Ness County: R. H. Siegfried, Rooney & Thomas 1 McLean, NE NE NW 28-16s-25w. Dry. TD 4,547 ft.

Norton County: Jones, Shelburne & Farmer 1 Horeby, SE SE SE 29-3s-23w. Dry. TD 3,772 ft.

Pawnee County: Armer 1 Leffert, NE NE NE 30-21s-16w. Dry. TD 3,896 ft.

Vickers Exploration Ltd., 1 Hogan, NW NW NW 22-23s-18w. Dry. TD 4,507 ft.

Reno County: Dozier Oil Co. 1 Newell, SE SE SW 8-22s-10w. Dry. TD 3,635 ft.

Rush County: Imperial Drilling Co. 1 Zetko, SW SW NW 11-18s-18w. Dry. TD 3,926 ft.

WINTERIZING

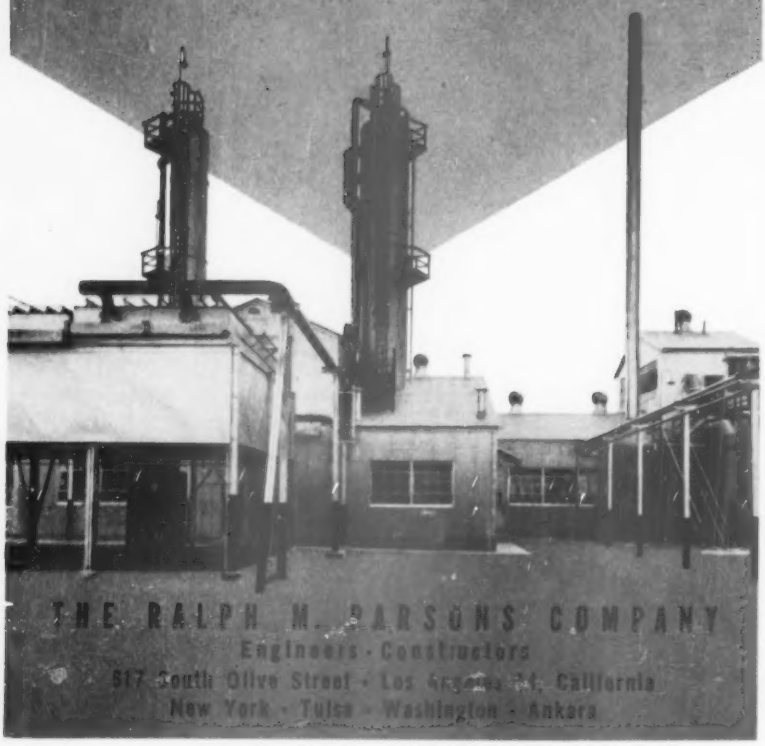
PROCESS PLANTS

by

PARSONS

Protecting process units and complete plants from severe winter operating conditions is a Parsons specialty.

Twelve "winterized" process plants have been designed and constructed by Parsons in Alaska, Yukon, Alberta, British Columbia, Montana, Utah, Idaho, and Wyoming.



THE RALPH M. PARSONS COMPANY

Engineers - Constructors

617 South Olive Street - Los Angeles 14, California

New York - Tulsa - Washington - Ankara

WILDCAT COMPLETIONS

Russell County: GMR 1 Kunz, SW SW SW 19-14s-15w. Dry. TD 3,389 ft.

Stafford County: Petroleum, Inc. 1 Meyer, NE NW SW 19-23s-12w. Dry. TD 3,916 ft.

Sumner County: Buffalo Oil Co. 1 Garitson, NW SE NW 17-33s-2e. Dry. TD 3,825 ft.

EASTERN NEBRASKA

Brown County: Phil Lynch 1 Campbell Ranch, C SE SW 11-26n-22w. Dry. TD 2,230 ft.

NEBRASKA

Buffalo County: Midwest Oil Corp. 1 Mary Bernert, SE NE 34-10n-16w. Dry. TD 4,118 ft. Arbuckle 4,053 ft.

Cheyenne County: The Chicago Corp. and Republic Natural Gas Co. 1 State, NE SW NE 16-14n-51w. Dry. TD 5,005 ft. "J" sand 4,945 ft.

Fred Manning 1 E. N. Johnson et al, C SE SW 2-14n-52w. Dry. TD 5,178 ft. "J" sand 5,126 ft.

Cheyenne County, Wenkleman: Anschutz Drilling Co. 1 Wenkleman, C SW SE 34-17n-51w. IPP 66 BOPD, "J" sand discovery—new field. "J" sand 5,074 ft. TD 5,159 ft.

Frontier County: Shell Oil Co. 1 Sayer, C SE NW 17-6n-25w. Dry. TD 3,161 ft. Lansing 2,912 ft.

Phelps County: Pure Oil Co. 1 Kline, NW NW SW 13-6n-18w. Dry. TD 4,125 ft. Lansing 3,515 ft.

NORTH DAKOTA

Barnes County: Wright & Pollard 1 A. H. Gregory, C SE SW 23-143n-61w. Dry. TD 1,690 ft.

Bottineau County: Calvert Exploration 1 Kornkven, NW SE 32-164n-77w. Dry. TD 3,500 ft. (?).

Morton County: Deep Rock Oil 1 John Gangel "A," C NW NW 11-135n-82w. Dry. TD 5,345 ft. Lodgepole 5,240 ft.

CALIFORNIA

Fresno County: L. A. Harnish, Opr. 86 32F, 32-20s-16e. Dry. TD 8,831 ft.

Humbolt County: Richfield Oil Corp. 1 Zanone, 13-1s-3w. Dry. TD 2,560 ft.

Kern County: Barratt & Bysshe 74-A Portals, 33-29s-29e. Dry. TD Pyramid Hills 4,830 ft., Vedder 4,955 ft., TD 5,000 ft.

Carlton Beal & Associates 56-11 Kalloch, NW SE 11-25s-18e, IPF 569 BOPD, 20/64-in. choke, 31.5°, 400 psi. tubing pressure, perfs. 4,590-4,865 ft. in sand stringers of Tumey shale (Oligocene), Pyramid Hills thrust fault 4,100 ft., Point of Rocks sand 5,727-7,496 ft., TD 7,801 ft., PB 5,337 ft. (New field discovery in Alferitz Anticline area.)

J. V. Dougherty & Associates 65-14 "Well," 14-11n-19w. Dry. TD 8,796 ft.

J. R. Farned 1 Farned, 14-11n-18w. Dry. TD 500 ft.

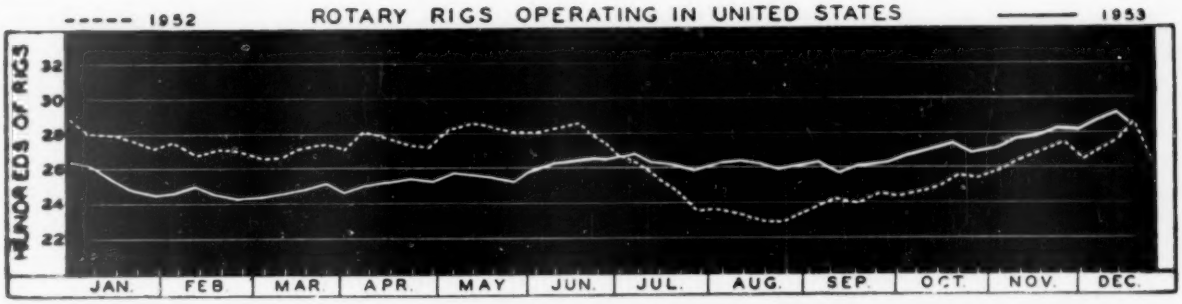
C. R. Robinson, Opr. 41-25 Ripley, 25-11n-23w. Dry. Middle Miocene 2,315 ft. TD 7,505 ft.

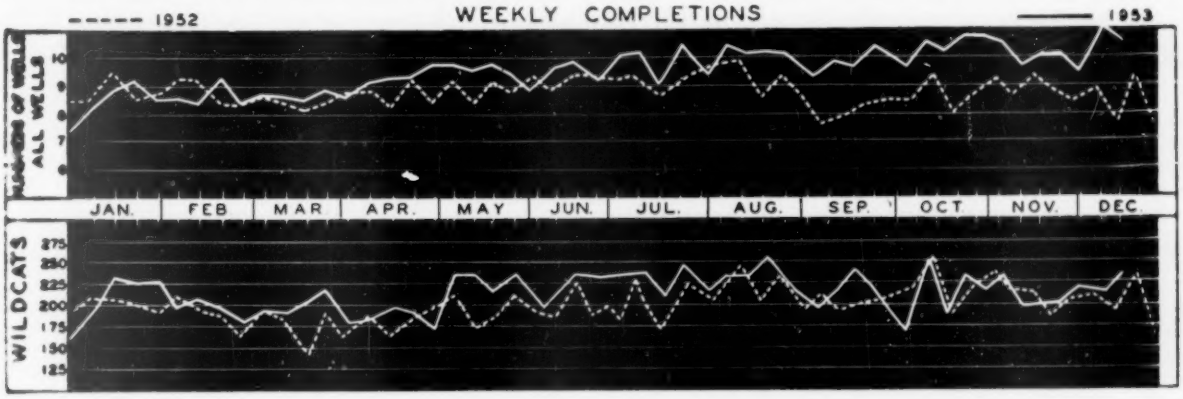
Superior Oil Co. 51-36 K.C.L., NW NE 36-30s-26e, IPF 112 BOPD, 9/64-in. choke, 36.3°, perfs. 8,096-8,104 ft., TD 8,500 ft. (New Stevens sand field discovery in Old River area.)

Los Angeles County: Sunray Oil Corp. 117 R.S.F., 34-4n-17w. Dry. TD 10,934 ft.

Tide Water Associated Oil Co. 1-36 McNally, NE SW 22-3s-11w, IPF 250 BPD, 25 per cent cut, 8/64-in. choke, 410 psi. tubing pressure, perfs. 11,918-12,002 ft., TD 12,229 ft. (New field discovery in La Mirada area.)

(Continued on page 155)





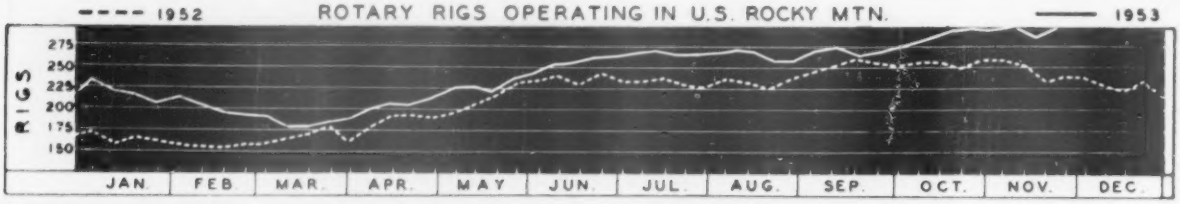
CURRENT STATISTICS

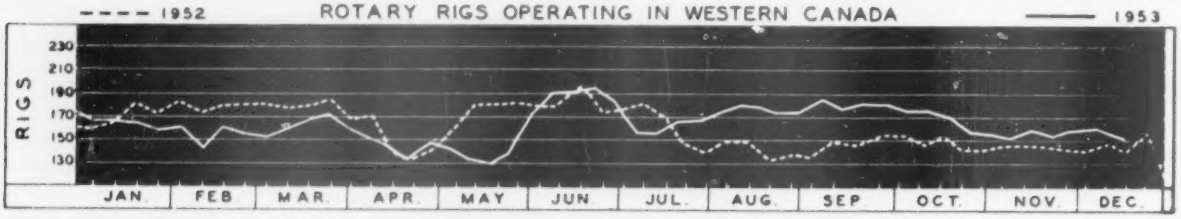
EXPLORATION

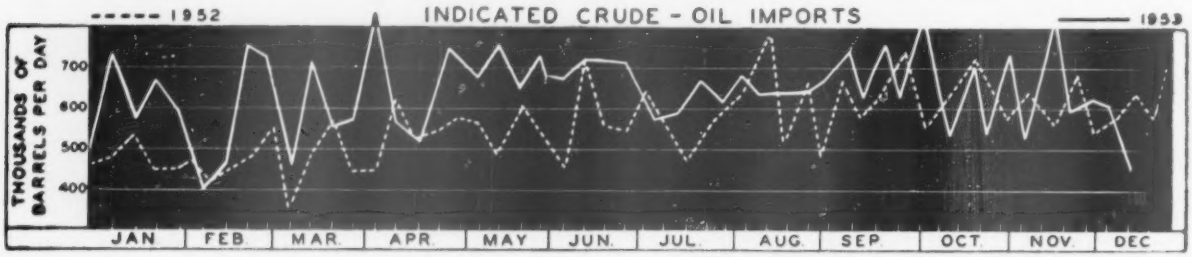
WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 19, 1953

	Total of all wells					Dec. 19		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	14	7	0	*7	22,550	735	750	0	0	0	0	0	0	0	0	0	0
Pennsylvania	39	19	5	‡15	86,378	1,863	1,868	0	0	0	0	0	0	0	3	14	17
West Virginia	7	0	7	0	18,948	609	575	0	0	1	0	1	0	0	12	9	21
Ohio	23	13	4	‡6	45,581	1,035	1,044	0	0	0	0	0	2	0	5	14	21
Indiana	20	5	0	15	29,259	1,290	1,251	0	0	0	9	9	13	0	3	352	368
Kentucky	31	15	3	13	57,113	1,156	1,273	2	0	0	4	6	14	0	1	194	209
Illinois	58	43	0	15	160,424	2,137	2,086	0	0	0	7	7	5	0	0	409	414
Michigan	10	8	0	2	33,747	602	680	1	0	0	2	3	18	0	5	248	271
Kansas	72	34	0	38	257,934	4,595	4,400	2	0	0	15	17	90	0	35	727	852
Nebraska	7	1	0	6	27,000	308	275	1	0	0	6	7	18	0	5	130	153
Oklahoma	162	92	9	61	566,114	7,270	5,595	0	0	1	13	14	112	6	36	576	730
Texas	400	242	22	136	1,772,051	16,633	16,615	11	3	2	94	110	824	63	159	4,072	5,118
North Central (Dist. 7-B & 9)	136	75	0	61	475,943	6,274	5,432	7	0	0	39	46	430	0	17	1,612	2,059
West (Dist. 7-C & 8)	83	58	0	25	457,455	3,611	4,889	2	0	0	21	23	172	2	13	662	849
Panhandle (Dist. 10)	46	38	6	2	151,281	766	626	0	0	0	1	1	0	2	0	21	23
Eastern (Dist. 5 & 6)	15	4	5	6	80,575	779	766	1	0	0	4	5	23	2	5	255	285
Gulf Coast (Dist. 2 & 3)	56	31	7	18	320,978	2,458	2,555	0	2	1	11	14	98	28	67	669	862
Southwest (Dist. 1 & 4)	64	36	4	‡24	285,819	2,745	2,347	1	1	1	18	21	101	29	57	853	1,040
Louisiana	52	32	4	16	326,212	2,731	2,307	2	0	0	8	10	85	36	21	360	502
Northern	26	19	0	7	71,384	1,220	1,244	0	0	0	2	2	12	2	2	155	171
Southern	26	13	4	9	254,828	1,511	1,063	2	0	0	6	8	73	34	19	205	331
Arkansas	7	1	0	6	35,452	550	402	0	0	0	3	3	12	0	0	128	140
Mississippi	10	0	0	10	69,640	388	341	0	0	0	7	7	20	1	5	171	197
Southeastern States	1	0	0	1	5,993	141	79	0	0	0	1	1	1	0	0	115	116
Montana	9	5	0	4	34,934	438	336	0	0	0	1	1	12	0	0	112	124
Wyoming	32	23	0	9	149,688	847	667	2	0	0	3	5	27	0	3	146	176
Colorado	12	2	0	10	68,019	702	467	0	0	0	7	7	29	0	12	306	347
Utah	0	0	0	0	0	70	79	0	0	0	0	0	3	0	4	35	42
New Mexico	23	11	9	3	142,177	1,364	1,011	0	0	1	1	2	26	1	18	123	168
California	55	36	0	19	265,226	2,484	2,348	4	0	0	17	21	69	1	13	551	631
North Dakota	5	2	0	3	27,474	257	114	0	0	0	3	3	9	0	1	75	85
Miscellaneous	0	0	0	0	0	73	131	0	0	0	0	0	1	0	4	45	50
Total United States	1,049	591	63	395	4,201,914	48,278	44,694	25	3	5	201	234	1,390	108	345	8,912	10,755
Total previous week	1,106	602	74	430	4,353,572			34	4	4	173	215	1,365	105	340	8,711	10,521
Total December 20, 1952	923	441	55	427	3,923,440			32	0	6	197	235	1,332	77	250	8,504	10,163

Service wells included: *7, ‡12, ‡2.



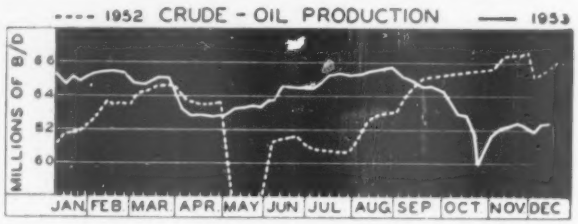


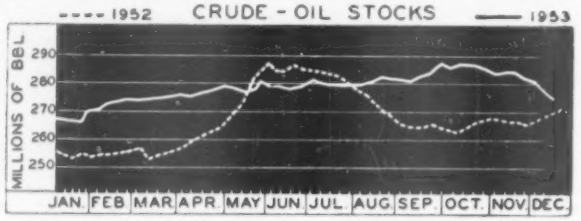


DAILY AVERAGE PRODUCTION FOR WEEK

	December 19 Crude oil	December 19 Lease condensate	December 19 Total	Dec. 12 total
Alabama	4,300		4,300	4,500
Arkansas	75,900	600	76,500	78,800
California	1,010,100		1,010,100	1,010,100
Colorado	106,700		106,700	108,200
Eastern	59,500		59,500	59,500
Florida	1,475		1,475	1,475
Illinois	168,400		168,400	167,200
Indiana	34,000		34,000	32,300
Kansas	321,500		321,500	324,400
Kentucky	32,700		32,700	32,500
Louisiana	625,800	40,400	666,200	665,300
North	104,300	3,400	107,700	106,800
South	521,500	37,000	558,500	558,500
Michigan	33,100		33,100	32,600
Mississippi	92,700	3,250	95,950	94,150
Montana	34,900		34,900	34,100
Nebraska	14,000		14,000	13,900
New Mexico	192,600	900	193,500	193,700
Oklahoma	533,700		533,700	524,900
Texas	2,558,050	48,175	2,606,225	2,606,225
Dist. 1	38,575	425	39,000	39,000
Dist. 2	134,975	6,225	141,200	141,200
Dist. 3	412,250	23,650	435,900	435,900
Dist. 4	239,500	6,050	245,550	245,550
Dist. 5	44,350	450	44,800	44,800
Dist. 6	114,100	5,200	119,300	119,300
East Texas field	231,100		231,100	231,100
Dist. 7-B	120,500	50	120,550	120,550
Dist. 7-C	154,925	4,425	159,350	159,350
Dist. 8	807,700	1,400	809,100	809,100
Dist. 9	182,575	250	182,825	182,825
Dist. 10	77,500	50	77,550	77,550
Utah	4,400		4,400	4,700
Wyoming	242,300		242,300	242,900
North Dakota	14,300		14,300	14,800
Total U. S.	6,160,425	93,325	6,253,750	6,246,250
Change from previous week,			up 7,500	
Canada	230,000		230,000	231,075
Total U. S. production, January 1-December 19			2,278,393,900 bbl.	
Same period last year (crude plus cond.)			*2,212,465,205 bbl.	

*Includes 29,696,835 bbl. condensate.





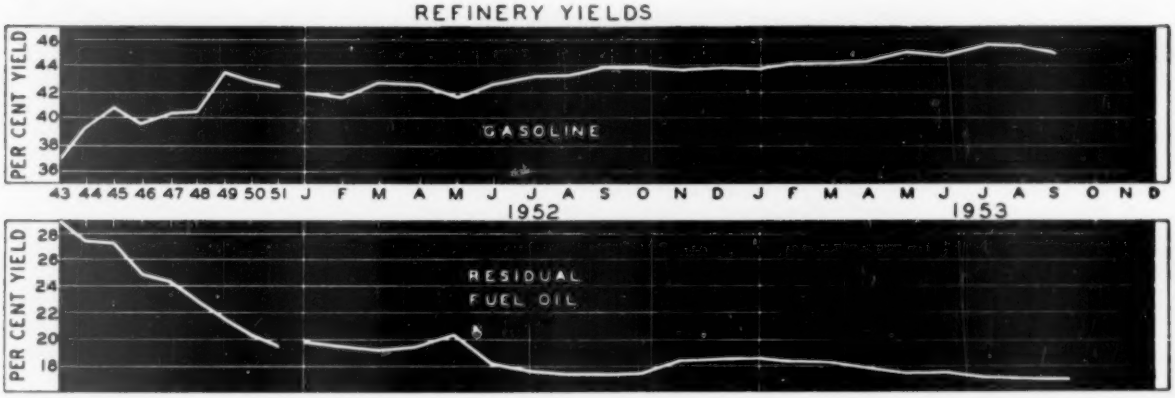
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

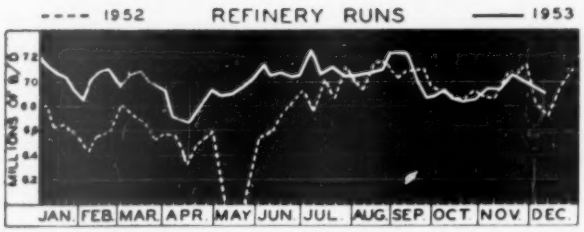
(Thousands of barrels)

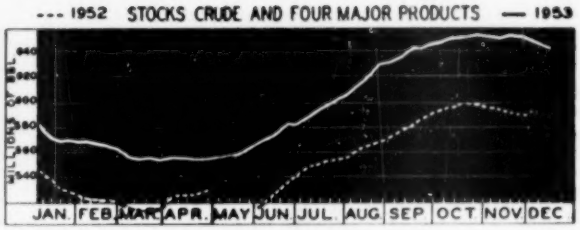
	Dec. 12, '53	Dec. 5, '53	Dec. 13, '52
Pennsylvania Grade	2,617	2,696	2,314
Other Appalachian	1,680	1,979	1,616
Illinois, Indiana, Michigan	12,243	12,651	11,496
Arkansas	3,431	3,364	3,241
Louisiana	17,252	17,207	16,318
North	3,110	3,126	2,344
Gulf	14,142	14,081	13,974
Mississippi	3,437	3,231	3,005
New Mexico	8,947	8,461	7,453
Oklahoma and Kansas	35,564	36,785	36,839
Texas	130,189	132,182	133,660
East Texas	11,491	11,531	12,139
West Texas	55,404	57,441	61,566
Texas Gulf	27,369	28,248	26,603
Other Texas	35,925	34,962	33,352
Rocky Mountain	16,925	16,923	14,882
California	34,662	33,584	30,928
Foreign	†10,463	11,465	7,789
Total	277,410	280,528	269,541

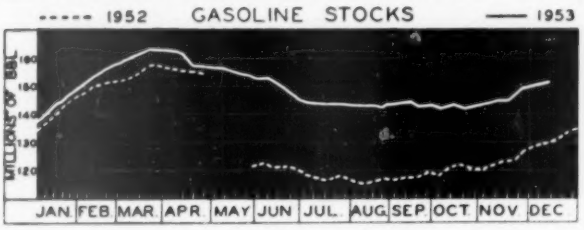
*Bureau of Mines. †Includes 3,362,000 bbl. in California.

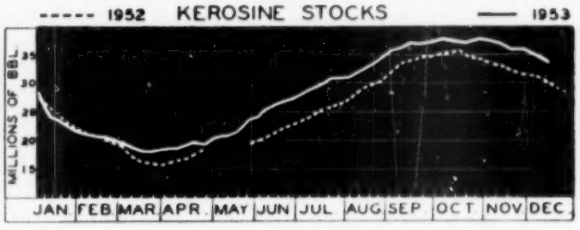
REFINERY YIELDS

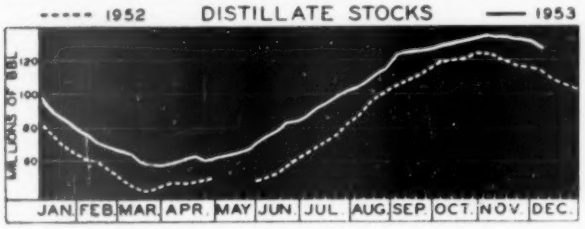


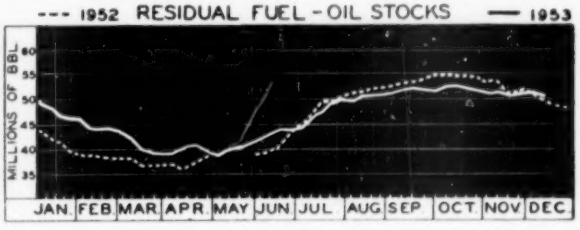




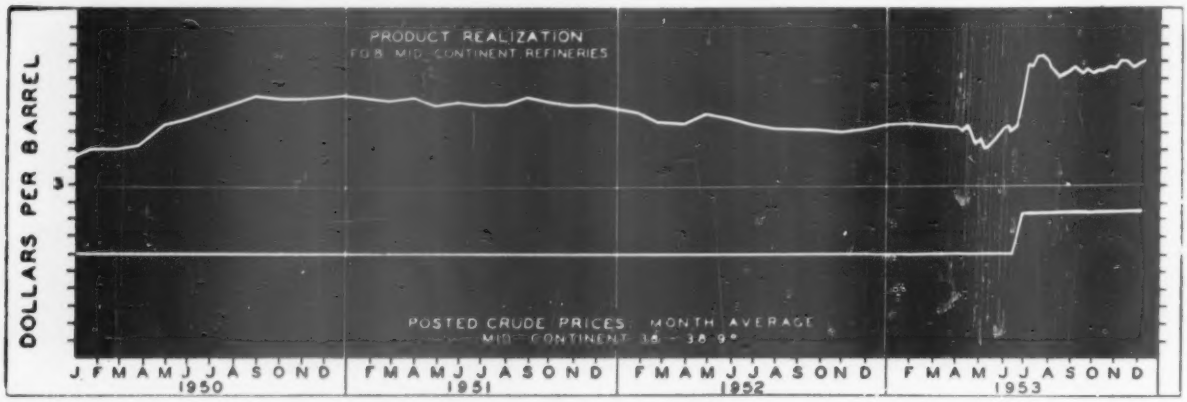








Since press time was advanced 1 day because of Christmas holidays, the regular weekly A.P.I. report could not be included in this week's issue. The table will be carried next week.


DOLLARS PER BARREL
PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.75 for week ended December 12, $3.70 for previous week, and $3.36 for December 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of December 22, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.875-11.5	12.5-13.5	10.75-11.75
Premium gasoline	11.875-12.5	13.75-14.5	11.75-12.75
42-44 w.w. kerosine	8.875-9.25	10.25-10.4	8.875-9.5
No. 2 straw fuel oil	7.875-8.25	9.25-9.4	8-8.5
No. 6 residual	$1.45-1.55	$2.25-2.40	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.5	5.0	5.25
Grade 18-55	6.6	6.10	6.35

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	13.75
750 vis., No. 3-4 neutral	16.75
2,000 No. 5-6 neutral	18-18.75

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19.5
200 vis., No. 3 neutral, 0-10 pp.	14.25

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	20.5
180 vis., 10 p.t. neutral	24.5

WAX
Mid-Continent

132-134 A.M.P.	6.0

THE cold wave that moved into the North Central states has tended to bring a better general feeling in heating-oil markets without any changes in prices. The accumulation of distillate stocks in primary storage of most market areas is large enough to discourage immediate changes in price even with marked improvement in demand.

As the colder weather spread over the northeastern states, there was some indication of movement out of secondary storage, but with most of the primary movement confined to shipments against contracts. Most suppliers in New York Harbor are quoting 9.4 cents a gallon for barge delivery of No. 2 fuel and 10.4 cents for kerosine. However, there were early-week reports of some material still available at 9.25 cents for No. 2 and 10.25 for kerosine. Some marketers believe that it will take only about a week of good heating weather to use up enough of the distress material to return the low of the spot market to normal quotation.

Even the normal posting of 9.4 cents a gallon for barge delivery of No. 2 in New York Harbor is about 0.15 cent under the low of quotations at this time last year despite the increase in crude prices last June.

Gulf Coast prices for heating oil are about on the same level as last year, and Group 3 prices are only up about 0.25 cent a gallon. Cargo prices for gasoline on the Gulf Coast also are back down to the year-end level of 1952. Spot prices for gasoline on the Group 3 market are up about 0.5 cent a gallon over last year.

Residual fuel is the only major product with enough increase in price over last year to cover the crude-price increase, if all major marketing areas are considered, and even the gain for this product has been due to low prices last year rather than to present prices.

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.*	Oklahoma, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast ‡Includes New Mexico Permian.

Prices East of California effective June 15, 1953. California prices effective February 16, 1953. Pennsylvania Grade prices effective September 21, 1953.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.05
Southwest Pennsylvania	3.61
West Virginia	3.55
Ohio	3.54
Illinois Basin	3.02

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Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EQUIPMENT FOR SALE

SPUDDER RIG Bargain. $750.00 no tools. Need money my part drilling shallow proven lease. Or sell part of lease. Box 235, Wagoner, Oklahoma.

JOY 250, tandem trailer mounted with tools and drill pipe, located Tulsa. A-1 condition. Inquiries to Box 6147, Tulsa, Okla.

SULLIVAN 200, tandem trailer mounted with tools and drill pipe, A-1 Condition, ready to go. Inquiries and inventory to Box 6147, Tulsa, Okla.

FOR SALE: One truck mounted portable rotary drill. Capacity 5 inch hole 1200 feet. Stanolind rig. Truck is D40 International Year 1940, with 2 speed rear axle. 8.25 x 20 tires all around. Rig uses 2⅜ inch drill rods, has 4 x 6 Gardner-Denver Pump. Price $2500.00. Layne-Western Company, 1010 West 39th Street, Kansas City, Missouri.

EVERYTHING in new and used equipment for well drilling. Fishing tools rented. Save money, get quotations from Pressey & Son, Pueblo, Colorado.

BROWN 100" and 25", 1000# wp Square Root, 1-10 liquid or gas flow meters, used, less mercury, $175.00 ea. W. J. Stroud, Bel Oil Corporation, Elton, Louisiana.

FOR SALE: Complete refrigeration type propane recovery plant for sale near Snyder, Texas. Capacity—25,000 MCF per day gas at 450± gauge; 30,000 gallons per day propane. Gas Products Development Corporation, 201 Oil Capital Building, Tulsa Oklahoma.

FOR SALE—3500 TONS
PORTABLE STEEL IRVING GRID AIRFIELD OR ROAD MATS
Ideal on sand, dirt or mud
Will be sold in any quantities
Rail and Barge Shipping Facilities
ALTER CO., Davenport 12, Iowa

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.
H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE
COMPLETE COMPRESSOR STATION
Two 600 H.P. Type L.V.G. Ingersoll Rand gas engines with high pressure compressors. Engines and compressors complete including Parkersburg Building. Located twenty miles from Houston. Contact—
PETROLEUM MANAGEMENT CO.
565 San Jacinto Building, Houston, Texas
Phone: CHarter 4761

EQUIPMENT FOR SALE

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

REDA PUMP complete w. #4—20 Motor, 45½ H.P., 650 Volt, 41.6 Amps. #90—Pump Housing, #5595—Switchboard w/recording Ammeter 3400'—#4 Cable 125 Amp. Auto Transformer Accessories. Engine 225 H.P. Climax Type R-225 on Skid. Alternator G. E. 125—KVA, 100 KW, 440 V. A. C. w/Transformer, Flexible coupling and skid base. House—10' x 18' wood frame, w/G.I. Roof and Siding on Skid. Engine—165 Hp. Climax R-61 on Skid. Herndon Drilling Co., 421 Mayo Bldg., Tulsa, Phone 4-9700.

MODEL H CARDWELL servicing unit with mast. Truck mounted. Fully equipped. Now operating in Central Kansas. Box G-823, The Oil and Gas Journal, Tulsa, Oklahoma.

250,000 FT. 8⅝ o.d. pipe with collar and plain end. $1.00 per foot Oklahoma. Rogers & Lindquist, 620 Wright Building, Tulsa, Okla. Phone 3-2072—5-8850.

FOR SALE: Failing Model 1500 drilling equipment. Have available for sale several drills exceptionally complete and in excellent condition. Particularly suitable for water well or deep core work. This equipment relatively new and now operating. Substantial savings possible. Box G-738, The Oil and Gas Journal, Tulsa, Oklahoma.

USED EXCELLENT CONDITION IN OPERATION
One Each (4¾" to 1") (13⅜" to 4½") LANDIS Leadscrew Receding Head Pipe Threading and Cutting Machine Motor Driven.
OILFIELD SALVAGE CO., INC.
Phone CHarter 6914
P. O. Box 2589 Houston

REID MACHINE and SUPPLY CO.
OIL CITY, PA.
279-298 Elm St. Phone 6-6631
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NOW OPERATING AS A GENERAL MACHINE SHOP
Specializing in
REPAIR PARTS
For
ENGINES & POWERS
Previously Furnished By
Joseph Reid Gas Engine Co.

EQUIPMENT FOR SALE

GAS METERS, Westcott, Foxboro and Emco. Good condition and can furnish most any type or capacity. Geo. R. Milner, Okmulgee, Oklahoma.

FOR SALE: On our O'Brien "E" lease, south of Liberty, Texas, one used Wilson Supply - Ingersoll - Rand Type ES, 4⅞" X 2¾" X 7" 2 stage portable packaged compressor unit, driven by Waukesha engine, Model 6SRKRU new June 50 Price $5500.00. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: (To settle estate) Complete Rotary Drilling Rig—U15 Unit Rig Draw Works with two ME66 Murphy Diesel Drive, 7¼ by 14 Emsco Pump, 96' Lee C. Moore Mast. Excellent Condition. Mrs. W. D. Kelley, Pampa, Texas.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

NOTICE: We buy. We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

REAL ESTATE

FOLLOW THE BOOM in uranium used for atom bombs. I offer 30 claims near Uravan, Colorado, for $2,000 each for immediate sale. Dyer, 1835 Champa, Denver, Colorado.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

ODESSA WAREHOUSE SPACE AVAILABLE
Located in center of town just off Highway 80. Up to 1600 sq. ft. available. Joint tenancy. Can be arranged with telephone answering and warehouseman service.
STENTZ EQUIPMENT COMPANY
P.O. Box 3387 Phone: 8-3388
Tulsa, Oklahoma

HELP WANTED

CHEMICAL ENGINEER BS, age to 35, 3 to 5 years experience in hydrocarbon process plant design, Gulf Coast location. Reply should include full resume of education, experience, references and salary expected Box G-836, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL INDUSTRY Employment Service, 405 Tuloma Bldg., Tulsa, Okla. Suggest you file resume of your education and experience with us.

CHIEF CHEMIST experienced in Pod column work and gasoline plant process and product control testing to take charge of laboratory located at large gasoline plant in West Texas. Housing furnished and salary to be commensurate with qualifications of applicant. Please furnish experience record and salary expected. Our employees have been notified of this advertisement. Box G-776, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC SUPERVISOR required by expanding and aggressive seismic contracting company. Should have ability to supervise any domestic area and have good professional contacts. Minimum requirements: college degree in geophysics or related fields and eight years' seismic experience. Good future. Tulsa location. Box G-705, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR ENGINEERS,
FIELD & OFFICE STAFF
—OILMEN CONSULT—
GOOD EMPLOYMENT AGENCY
Skilled free service by technicians

1554 California St. **AC. 0835**
Denver, Colorado **(24-hr. service)**

SALES ENGINEER
Up to $10,000

Graduate Engineer Preferred

Experienced in Plant Instrumentation or related fields.
Interviewing and moving expenses, plus our fee, all paid by Company.

Send complete and up-to-date resume to—

CHAS. J. LOVELESS PERSONNEL SERVICE
Suite 616 South Main—Tulsa, Oklahoma

HELP WANTED

MAN with minimum of two years experience on electric and/or radio activity logging interpretation. Opportunity for advancement with major oil company—probable location Tulsa. Salary commensurate with experience and ability. Box G-837, The Oil and Gas Journal, Tulsa, Oklahoma.

TRAFFIC MAN to handle all phases of tank car movements for petroleum products in newly organized company-owned traffic department. Salary commensurate with qualifications. All replies will be considered confidential. Mail letter of application to Box G-838, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

PETROLEUM ENGINEER, 30, married, 4 years varied experience—reservoir, production, completions, remedial work. Desires responsible position with aggressive independent or individual. Box G-839, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE—CERTIFIED PUBLIC ACCOUNTANT—COLLEGE DEGREE offers 17 years' experience in developing and managing oil and gas properties, operating hydrocarbon recovery plants. Familiar with taxes, financing, marketing, lease arrangements, joint ventures. Seeking responsible position in Houston. George D. Blocher, 3638 Wichersham Lane, Houston 19, Texas.

CHEMICAL ENGINEER, age 40, fifteen years' experience in the operation and design of Gasoline Plants, Refineries, and Petro-Chemical Plants, specialized in the design and operation of high purity ethylene plants. Desires responsible position with a progressive Oil Company. Box G-791, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT, oil p oduction and heavy industrial experience. Box G-824, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

DEERE & COMPANY

Now staffing engineering and research department for new petrochemical project located at Pryor, Oklahoma. The following professional positions are open—

CHEMICAL ENGINEERS—For process development, process design, economic evaluation, and technical service to plant operations. Should have B. S. or M. S. in chemical engineering and 5-10 years experience in design and operation of chemical process plants.

SUPERVISING RESEARCH CHEMIST—Will be responsible for organizing and directing applied research group in fields of agricultural and organic chemicals. Research will be directed toward development of new processes for product upgrading and diversification. Should have advanced degree in chemistry or chemical engineering and 5-10 years industrial research experience.

RESEARCH CHEMIST—For process research on agricultural and organic chemicals. B.S., M.S., or Ph. D. in chemistry and 3-10 years industrial research experience in related fields.

CHIEF CONTROL CHEMIST—Will be responsible for setting up plant analytical control group. Should be graduate chemist with 5 or more years of experience in analytical control work including supervision. Infra-red spectrophotometer experience desirable.

Exceptional opportunity to advance in newly formed chemical division of well established farm machinery manufacturing company. Plant now under construction to produce ammonia and urea from natural gas. Please send resume and salary requirement to:

W. W. Yeandle, Works Manager
Grand River Chemical Division of Deere and Company
Pryor, Oklahoma

Your letter will receive prompt action and will be held in strict confidence.

SITUATIONS WANTED

EXPERIENCED LAND MAN: Age 50, 24 years experience, mostly with major companies in Texas, New Mexico, Louisiana, Mississippi, Georgia, Florida, Alabama. Degree Civil Engineering plus 1 year Geology, plus 1 year Law. Qualified for any position in Land Department. Free to move to any area. Box G-835, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER, 28, 5 years refinery engineering and operating experience. Desires engineering or supervisory position with refinery, petrochemical or engineering organization. Box G-826, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST, desires position as Seismic Supervisor. Thirteen years experience. Education in electronics and geology. Particularly interested in record reinterpretation. Box G-833, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628, Ph. No. 3-3141, Hobbs, New Mexico.

AVAILABLE, Construction Superintendent. Roads, bridges, harbor work, plant erection, prefer foreign contract. Write Walkinshaw, Room 506, 372 Bay Street, Toronto.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

ELECTRICAL CONTRACTORS

Office Phone 5-5315 **Res. Phone** 7-4950

W. L. RATCLIFF COMPANY
ELECTRICAL CONTRACTORS
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W. L. Ratcliff **506 Caddo St.**
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FINANCING

GAS FINANCING

We finance the installation of gathering systems, compressor stations, processing plants, etc., and purchase casinghead and natural gas.

Well owners are paid for their gas and also participate in operations. Reply in confidence to

Box G-802

The Oil and Gas Journal

Tulsa, Oklahoma

LEASE AND DRILLING BLOCKS

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

LEASE AND DRILLING BLOCKS

160 ACRES wheat land, Twp. 163, Range 95, Divide County, North Dakota. $15,000, or ½ mineral rights $8,000. 4118 Cedar Avenue, Minneapolis, Minnesota.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

SEE A. L. Bowles, Rollow Building, Ada, Oklahoma, for drilling deals.

DAILY PRODUCTION FOR SALE shallow field, substantial proven acreage. Priced right. Box G-834, The Oil and Gas Journal, Tulsa, Oklahoma.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

CANADIAN LEASES: 10,000 acres British Columbia, open for offers—Quarter Section Pincher Creek area Alberta, Price $10.00 acre—2% Gross Royalty. Quarter Section Red Deer and Clive area Alberta, $1,000.00 per 1%. Box G-827, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

OFFERING CHOICE ROYALTIES on geology in Oklahoma's greatest oil fields. A. S. Berry, 522 Wright Bldg., Phone 5-5402, Tulsa, Oklahoma.

FREE TAX INFORMATION for those desiring to sell their producing royalties, overrides or production. Robert L. Kinkaid, Box 26, Tulsa, Oklahoma.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT MEN . . . in the News

Betley Made Aeroquip General Manager

M. J. BETLEY

The appointment of Matthew J. Betley as vice president and general manager of Aeroquip Corp., Jackson, Mich., manufacturer of flexible hose lines and hydraulic fittings, has been announced recently by Peter F. Hurst, president.

Betley joined Aeroquip in September 1952, and was named vice president-manufacturing in 1953. In his new post Betley will be responsible for sales, engineering, financial, and manufacturing functions of Aeroquip, including management of three wholly owned subsidiaries; Aeroquip, Inc., Van Wert, Ohio; Aero-Coupling Corp., Burbank, Calif.; and Eibeeco, Inc., Jackson, Mich.

Rockwell Names Proske to National Meter Sales

H. O. Proske, service manager for Rockwell Manufacturing Co.'s Meter and Valve division, has been named national representative specializing in gas-meter sales promotion, it has been announced by Gilbert T. Bowman, recently appointed manager products department.

In his new position, Proske will supervise sales and production liaison between the firm's gas-meter-manufacturing plants and field sales force and sales management.

This new arrangement is being adopted to provide faster and better service for gas-meter customers, and to keep gas-meter-manufacturing facilities in close touch with field gas-measurement activities. Proske joined Rockwell in 1937 as sales engineer in the Kansas City area and was promoted to service manager in 1952.

Anniversary of Track-Type Tractors To Be Observed

Caterpillar Tractor Co. President Louis B. Neumiller and Executive Vice President H. S. Eberhard unveil a large medallion at Peoria, Ill., representing the theme for a commemorative program for 1954 to celebrate the fiftieth anniversary of the world's first practical track-type tractor. This anniversary dates back to the successful testing of the first practical crawler on November 24, 1904, in Stockton, Calif., by Holt Manufacturing Co., one of Caterpillar's parent companies. It was Holt which originated the trademark, "Caterpillar" at about the same time it made its first crawler.

C. Lee Cook Names Mettling Sales Manager

P. W. METTLING

The election of Phillip W. Mettling to vice president and general sales manager of C. Lee Cook Manufacturing Co., Louisville, has been announced by F. D. Durham, president of the company. C. Lee Cook Manufacturing Co. manufactures metallic compressor piston-rod packings and graphitic iron piston rings.

Prior to joining C. Lee Cook, Mettling had served for 11 years as Los Angeles manager for Cooper-Bessemer Corp., covering the southwestern part of the United States. He will make his headquarters in Louisville.

Pelton Opens Service Office at Hobbs, N. M.

N. N. BAGLEY

A sales and service office has been established at Hobbs, N. M., by Pelton Water Wheel Co., of Los Angeles. According to D. P. Billings, general manager of Pelton, Nolan N. Bagley has been promoted from the service department at Odessa, and will be in charge of sales and service in Hobbs.

Bagley is thoroughly familiar with the Pelton long stroke pumping jack from his wide experience in field and installation work. A complete stock of parts for all Pelton units will be available at the Hobbs headquarters, and 24-hour service will be maintained.

American Meter Announces Sales Staff Changes

C. J. Kribs has been made assistant to the manager of the Southern division of Westcott & Greis, Inc., subsidiary of American Meter Co., makers of precision instruments for measurement and control of gas, oil, L.P.-gas, and other fluids, and Lee Holt has joined American Meter as sales engineer covering parts of Arkansas, Louisiana, and East Texas.

Kribs was employed by Southern Natural Gas Co., in 1930 and became a division measurement supervisor. In 1949, he joined Westcott & Greis.

After considerable experience with

United Gas Pipe Line Co. in the instrument field, including a period as instrument technician in the research department, Holt became a member of American Meter.

Petroleum Laboratory Expands Services

T. M. SIMPSON

As Petroleum Laboratory & Sales, of Odessa, Tex., enters its second business year, announcement is made of expansion of services. The company is going into field testing, including both test car compression and charcoal tests according to N.G.A.A. specifications, and tests for hydrogen sulfide, carbon dioxide, and other inert gases. Owner is T. M. (Jack) Simpson, who has been engaged in the laboratory and supply business for the past 10 years.

The Odessa laboratory works in conjunction with and as a central point between two experienced gas-testing firms, J. A. Thurmond & Co., in the Texas Panhandle and Northern New Mexico, and G. B. Greiner Gas Testing, in Breckenridge.

E. F. Walker Joins Dale S. Cooper & Associates

Evan F. Walker has been named to head the industrial division of the firm of Dale S. Cooper & Associates, consulting engineers of Houston. Walker resigned his position with Fluor Corp. to accept the appointment.

Having served the oil industry for the past 30 years, Walker has also performed engineering duties with Tennessee Gas Transmission Corp., Fish Engineering Co., United Gas Corp., and Magnolia Petroleum Co.

Communications Service Manager Named by Motorola

Daniel E. Noble, vice president in charge of Motorola's communications and electronics division, recently announced the appointment of John P. Tansey to the position of national service manager of that division.

Tansey succeeds Fred Schnell, who has been designated staff assistant to the vice president. Tansey, formerly service contact manager, is moving into this position, according to Noble, during a period of dynamic growth in the communications service aspect of the industry.

Patterson Opens District Sales Office in Houston

SCHOONOVER

A new district sales office has been opened in Houston by Patterson Foundry & Machine Co. Wayne Schoonover, who has served in an engineering capacity in the petroleum industry for the past 18 years, has been appointed manager of the new office.

This new Patterson sales office was established to provide faster, specialized service to the petroleum, chemical, and allied industries in Texas and Louisiana, according to Richard L. Cawood, president of the company.

Knight-Gordon Represents Oil Metering In Two States

Oil Metering & Processing Equipment Corp., Houston, announced the appointment of Knight-Gordon Engineering Co., Tulsa, as its representative in Oklahoma and Kansas.

ART KNIGHT

MILT GORDON

Oil Metering manufactures well testers, test separators, gas scrubbers, free-water knockouts, and other field metering and processing equipment. Art Knight and Milt Gordon are partners in the Knight-Gordon firm.

Fraser Opens New Harold Hill Headquarters

The opening of the new head offices of W. J. Fraser & Co., Ltd., at Harold Hill, Romford, Essex, England, marks the steady development of this century-old firm of chemical-engineering contractors.

The business was originally founded before 1830 with works at Houndsditch, and shortly afterwards, in 1836, removed to Commercial Road. In 1910, the main offices and works were established at Dagenham. Frasers became well known, not only as experienced constructors of various specilized types of plant, but also as main contractors for the complete engineering of chemical and similar projects.

This new modern building provides adequate headquarters and administrative offices. It also houses the purchasing and construction planning departments, as well as the entire technical staff of chemical engineers and design layout teams. In further extension at Harold Hill, planned for the near future, Frasers will reestablish its pilot plant and research departments, previously at Dagenham.

Appleton Electric Co. Appoints I. W. Strong

I. W. Strong, Denver sales representative of Appleton Electric Co., has been appointed assistant to the vice president in charge of sales, and will make his home in Chicago.

Strong is a graduate of electrical engineering from Purdue University.

Armour Assigned to Corpus Christi by Durametallic

G. A. ARMOUR

Announcement is made by Allison Walker, manager of Houston office of Durametallic Sales & Service, of G. (Gil) A. Armour as field engineer for the Corpus Christi area.

Crawford is New Hough Advertising Manager

Frank G. Hough Co., Libertyville, Ill., manufacturer of Payloader line of tractors and tractor-shovels, has announced the appointment of Madison L. Crawford as advertising manager.

Crawford has had an extensive background in sales, advertising, and materials handling with Clark Equipment Co. The last 6 of his 11 years with Clark were served as associate advertising manager of the industrial truck division.

Cowan Represents Darling

Darling Valve & Manufacturing Co., Williamsoprt, Pa., has announced the appointment of Joseph T. Cowan as district representative in the Tulsa territory.

Cowan is a long-time resident of Tulsa. His previous experience has brought him in close contact with oil, gas, and public-utility industries in the Southwest.

Carbide & Carbon Shifts Cole to Fine Chemicals

John M. Cole has been transferred to the fine chemicals sales group of Carbide & Carbon Chemicals Co., a division of Union Carbide & Carbon Corp., according to an announcement by H. B. McClure, executive vice president of the company.

Cole will assist in the market development of chemical intermediates with particular emphasis on chemicals for use by the petroleum industry. For the past 7 years, Cole has been a technical representative for Halowax products of Bakelite Co., another division of Union Carbide.

ADVERTISERS IN THIS ISSUE

Ajax Iron Works 6
Allis-Chalmers Mfg. Co. 28
American Cyanamid Company 10
Ampco Metal, Inc. 140
Anderson Brothers 115
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WILDCAT COMPLETIONS

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Merced County: Richfield Oil Corp. 1 Silverira, 9-9s-14e. Dry. TD 6,159 ft.

Orange County: Manco Production Co. 1 Sandralu, 11-6s-11w. Dry. TD 6,200 ft.

Monterey Oil Co. 1 Newport Beach, 29-6s-10w, IPP BOPD, 19°, perfs. 4,258-4,443 ft., TD 7,251 ft., redrilled TD 4,518 ft. (New field discovery offshore from West Newport field.)

Santa Barbara County: Mohawk Petroleum Corp. 4 Barham-Schmitz, 12-7n-32w. Dry. TD 6,803 ft.

W. F. Parker, Oper. 1 Packard, 11-7n-35w. Dry. TD 1,773 ft.

Santa Cruz County: The Texas Co. 1 Carpenter, 35-11s-1e. Dry. Bottomed in granite, TD 3,100 ft.

Sutter County: Richfield Oil Corp. 4 Butte Community-A, 9-16s-2e. Dry. TD 3,852 ft.

Tulare County: C. H. Olsson 2 Menne-Flynn, 9-24s-28e. Dry. TD 410 ft.

Ventura County: Union Oil Co. 2 Janss, 22-2n-21w. Dry. TD 6,514 ft.

Yolo County: R. S. Rheem, Oper. 1 Cowell, 16-7n-4e. Dry. TD 7,075 ft.

Ted Sterling, Oper. 1 Browning, 17-12n-1e. Dry. TD 3,820 ft.

MONTANA

Carbon County: Kirk Ziegler 1 Richardson, NW SW NE 15-7s-22e. Dry. TD 6,208 ft. Prior 6,125 ft.

WYOMING

Converse County, Crooked Stick anticline: Parker Drilling 1 R. B. Blackmore-Hammond, NE SW 13-31n-72w. Dry. TD 682 ft. Amsden 520 ft.

Fremont County, S. E. Sand Draw Unit: Sohio Petroleum 1 Unit, SE NW SE 36-32n-95w. IPF 254 BO in 4 hours, Phosphoria discovery—new pay. Phosphoria 8,180 ft. OWWO: OTD 8,799 ft. PB 8,628 ft.

Natrona County, Okie Government Unit: Superior Oil 36-14 Government, SW NE SW 14-37n-85w. IPP 180 BOPD, Phosphoria discovery—new field. Tensleep 3,015 ft. Tensleep 3,015 ft.

Niobrara County, W. Mule Creek: Anschutz Drilling Co. and Lario Oil & Gas 1 D. P. Hynes, NE SW NE 14-39n-61w. Dry. TD 3,500 ft. Madison 3,405 ft.

Weston County, Newcastle area: D. M. Love Associates 1 Engle, NW SW NW 26-45n-62w. Dry. TD 2,950 ft. Newcastle 2,884 ft.

COLORADO

Adams County: Petroleum Inc. 1 Wailes, NW NW SW 1-2s-58w. Dry. TD 5,970 ft. "J" sand 5,810 ft.

Twin T. Drilling Co. et al 1 Shafroth, NW NW NE 32-3s-57w. Dry. TD 5,615 ft. "J" sand 5,444 ft.

Garfield County, Atchee area: General Petroleum 1 Schulte, NW SE SW 15-6s-103w. Dry. TD 8,685 ft. Sowatch 8,025 ft.

Logan County: Shell Oil Co. 1 Mittelstaudt, C NE NE 23-10n-53w. Dry. TD 5,075 ft. "J" sand 4,991 ft.

Gray-Humphries & Leninger 1 Moeller, SE SE NW 30-3n-55w. Dry. TD 5,282 ft. Skull Creek 5,265 ft.

Rio Blanco County, Urado: Continental Oil Co. and English Oil 3 Government, NW NW NE 23-3s-103w. Dry. TD 2,814 ft. Mancos 2,202 ft.

Washington County: L. R. Magneson and C. L. Fowler 1 State, NW SW SW 32-2s-51w. Dry. TD 4,357 ft. "J" sand 4,156 ft.

MANITOBA

California-Standard 3-11 Scallion, LSD 3, 11-11-26w1. Mississippian oil well. TD 2,025 ft.

SASKATCHEWAN

Shell Oil Co.-Albercan A-6-30 Arena, LSD 6, 30-1-25w3. Dry. TD 5,700 ft.

Socony-Sohio 1 Bangor, LSD 14, 11-22-2w2. Dry. TD 3,055 ft.

Shell A-16-4 Minard, LSD 16, 4-5-7w2. Mississippian oil well. TD 4,900 ft.

Socony-Sohio 1 Mossbank, LSD 13, 27-11-28w2. Dry. TD 6,640 ft.

Socony-Woodley-Southern 20-4 East Premier, LSD 4, 20-14-17w3. Dry. TD 3,818 ft.

Tide Water-Ajax 2 White Bear, LSD 4, 3-10-2w2. Dry. TD 4,726 ft.

ALBERTA

High Crest-Canoil et al 1 Atlee, LSD 3, 34-21-7w4. Sunburst sand gas well. PBTD 3,362 ft. TD 4,092 ft.

Futurity 1 Leimbock, LSD 13, 12-23-13w4. Dry. TD 3,325 ft.

Tri-Tor 3 Dandy, LSD 11, 36-62-2w4. Dry. TD 1,160 ft.

Imperial 1-22 Eastgate, LSD 1, 22-57-22w4. Dry. TD 5,252 ft.

Amurex-Calvan 1-3 Three Hills Creek, LSD 3, 30-35-25w4. Madison lime gas well. PBTD 5,832 ft. TD 8,005 ft.

BRITISH COLUMBIA

Pacific 33 Fort St. John, LSD 4, 36-82-16w6. Dry. TD 6,694 ft.

LEGAL

Notice is hereby given that sealed bids for oil and gas leases on approximately 20,803.76 acres of Tribal and Allotted restricted Indian lands in Roosevelt and Valley Counties on the Fort Peck Indian Reservation, State of Montana, will be opened at 2:00 o'clock P.M., Mountain Standard Time, January 12, 1954, at the Fort Peck Indian Agency, Poplar, Montana. Those individuals desiring specific information in connection with this sale may contact the Superintendent, Fort Peck Indian Agency, Poplar, Montana, or telephone Poplar 2181.

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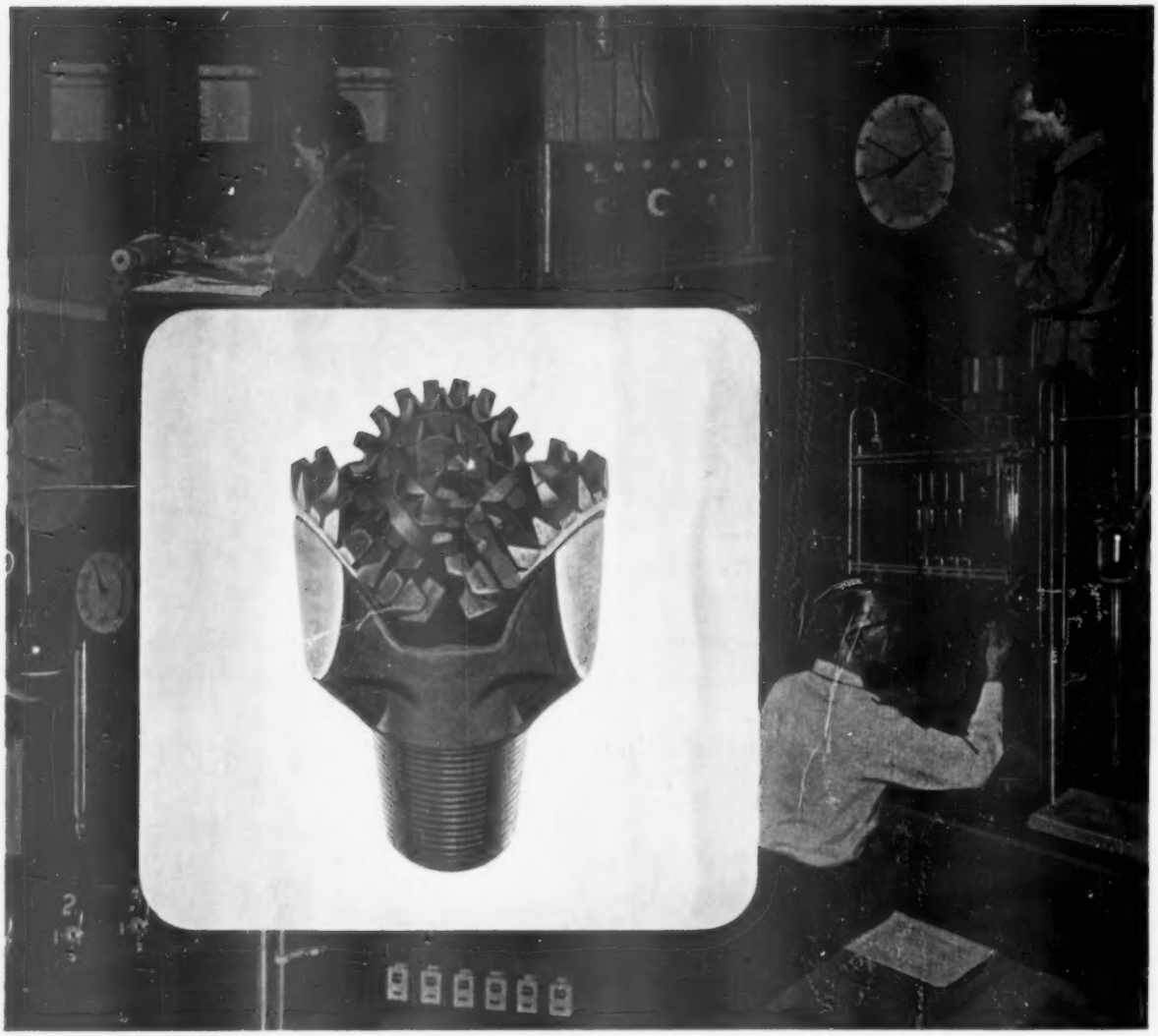

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